12-1999

Linking Corporate Goals and Shop Floor Performance

Loretta Cochran
Clemson University, lcochran@atu.edu

December 10, 1999

To the Graduate School:

This dissertation entitled "Linking Corporate Goals and Shop Floor Performance" and written by Loretta Ferguson Cochran is presented to the Graduate School of Clemson University. I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy with a major in Industrial Management.

[redacted]

J. W. Patterson, Dissertation Advisor

We have reviewed this dissertation
and recommend its acceptance:

[redacted]

L. D. Fredendall

[redacted]

P. L. Roth

[redacted]

T. P. Summers

Accepted for the Graduate School:

[redacted]

LINKING CORPORATE GOALS AND SHOP FLOOR PERFORMANCE

A Dissertation

Presented to

the Graduate School of

Clemson University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

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by

Loretta Ferguson Cochran

December 1999

Advisor: Dr. J. Wayne Patterson

ABSTRACT

Several different types of programs have been introduced to translate organizational goals into performance measurement and feedback systems that can be transferred to the shop floor level for employees. An overreaching assumption has been made that there must be subsets of objectives in order to motivate shop floor employees. In the field of human resources, performance management systems have been designed as vehicles for goal translation from top management to lower levels. The total quality management literature introduces hoshin planning as another formula for disseminating goals between layers within the organization.

An aggregate perspective on this linkage of performance and employees through employee management systems is presented using an approach that includes both the human resources and total quality directives. Open book management is introduced as an example of an integration of both systems. An intervention using open book management is conducted and the effect on employees and plant performance is reviewed.

DEDICATION

I dedicate this work to my family. Their unwavering support and encouragement made this dissertation possible.

ACKNOWLEDGMENTS

I would like to thank my advisor, Dr. J. Wayne Patterson, for his guidance, patience, and words of wisdom. I am grateful to my committee members: Dr. Larry Fredendall, Dr. Phil Roth, and Dr. Tim Summers. They were all supportive and contributed greatly to the completion of this dissertation. While not a committee member, Dr. Bill Bridges was of invaluable assistance throughout this process.

Finally, I would like to thank Dr. David Underwood. He has supported me throughout my graduate career. His example of scholarly leadership is one to which I can only aspire.

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CHAPTER I

INTRODUCTION

Finding the key that links business goals to performance outcomes is a current objective of strategy and operations researchers alike. The difficulty in acquiring a linkage between corporate level goals and hourly employees is found in the basic nature of performance measurement systems. Typical measurement systems support a process where corporate goals are expressed by groups of measures that differ at the corporate, plant, and shop floor level. Corporate performance measures are rarely consistent with or transferable to the shop floor systems—to the people who touch the product. Shop floor employees receive limited feedback, which tends to be local measures that do not have an obvious connection to the corporate goals. Presently, a good performance measurement system is one that includes goals to enable managers to monitor the implementation of the firm's strategy. Often, this type of system fails to apply to workers on the shop floor (Lee, Kwak, and Han, 1995).

Performance measurement systems were traditionally designed to support top down decision making with the use of financial information (Meyer, 1994). Consistently, established accounting measures have received criticism for being only historical representations of financial performance (Eccles and Pyburn, 1992). In order for corporate goals and measures to be motivating to employees, the objectives need to be expressed at a plant level and then at the shop floor level so that employees can see how they contribute to reaching corporate targets. This can be a daunting task given that individuals at

each level of the organization use performance measures that reflect their perspective of the company. Vora (1992) ranked the most frequently used performance measures by level of management, and concluded that most often top management used measures such as profit per capital investment dollar. In contrast, both middle and first line management listed physical output per unit of labor as their most frequently used measure. While top managers seem to be focused on measures that are financial in nature, lower levels of management tend to utilize more labor and material related measures.

The purpose of this study is three-fold. First, to build an aggregate perspective on this linkage of performance and employees through employee management systems. Employee management systems are presented that include both the human resources and total quality directives. Second, to introduce open book management as an example of an intervention utilizing both systems. Third, to conduct a preliminary examination of (1) employee attitudes and outcomes that are directly influenced by the open book management intervention; and (2) open book management's potential effect on plant performance.

The strategic objectives of a company can usually be grouped into two categories: financial and non-financial. These two categories include representative performance measures to capture the company's ability to perform relative to its objectives. Financial measures are typically derived via the accounting functions. Examples include return on investment, sales per time period, profit to sales ratio, inventory turn rates, and days receivables (Kenny and Dunk, 1989). Non-financial objectives include capabilities such as quality, speed (delivery), dependability (on-time), and cost efficiency (Ferdows and DeMeyer, 1990). In a taxonomy of manufacturing strategies, Miller and Roth (1994)

identify seven additional competitive capabilities to be measured which include design flexibility, volume flexibility, higher performance products, service after the sale, advertising, breadth of product distribution, and breadth of product line. Some of these non-financial objectives are trade-offs. DeMeyer, Nakano, Miller, and Ferdows (1989) note that flexibility and cost-efficiency are often at odds and that only advanced firms are capable of being successful with that trade-off.

McNair, Lynch, and Cross (1990) suggest a strategic approach to performance measurement. In their scheme, objectives flow down while measures of performance flow up in the pyramid. The levels begin with corporate vision at the top, and work down through the business units, ending with the department level as the base. At the base, there are non-financial measures, such as on-time delivery, quality, waste, etc. As one moves up the pyramid, both operational and financial measures are used. While feedback on measures at the lower level is obtained frequently (daily or weekly), further up the pyramid, feedback may be reduced to monthly or quarterly reports. While this study does identify ways to use financial and non-financial measures, it assumes that only shop floor specific measures are useful to shop floor employees.

Performance measurement systems should support company objectives. Approaches must be identified to ensure connecting the objectives of the company to daily shop floor activities. Vollman (1989) stresses, that in building an effective performance measurement system, a company must use its strategy to define the appropriate measures. They must be consistent with strategic objectives so that the company will have focus. Organizational focus occurs when the performance measurement system

links the differing levels of a company to all of the functional departments within the company in order to encourage interaction and relationships between these areas.

Connecting manufacturing and corporate performance requires a consistency in purpose throughout the measurement system (Beischel and Smith, 1991). To do this, a framework or hierarchy is established for each of the firm's competitive priorities. Then for each management level, measures that are a subset of the previous layer are established. The linkage requires that the subset measures meet the criteria of (1) being connected to the critical success factor (competitive priority) at the top and (2) being connected to the manufacturing process at the bottom that is controllable by the manufacturer. This continues all the way down to the components of the manufacturing process.

Although the linking of all levels of the organization to the corporate measures is critical, the difficulty lies in the direct connection between the shop floor and corporate goals (Keegan, Eiler, and Jones, 1989). For example, using the objective of optimal resource management, the corporate financial measure is return on assets and the process measures are machine downtime, percent of defect free output, and the number of unplanned schedule changes (Beischel and Smith, 1991). In between the top and bottom measures are inventory days and output per equipment dollar for the vice president of manufacturing. For the plant manager, linked measures are cycle time, finished goods inventory days, and days of vendor lead-time. The department manager may have a subset, which could include machine downtime, the number of unplanned schedule changes, and the percent of output that is defect free. Given all of the sources of influences on return on assets through means other than the intermediate measures, employees may

have a hard time grasping the connection. The linkages that connect the vice president to the plant manager to the department manager include measures that the shop floor employees feel are beyond their control.

Neely, Gregory, and Platts (1995) conclude that performance measurement systems are made up of groups of individual measures. When attempting to use both financial and non-financial measures, multiple and diverse performance measures may lead to confusion and lack of direction. Lewin and Minton (1986) note that performance is multidimensional and requires multiple measures. Difficulties arise when these measures are unrelated and lead to uncertainty towards the direction for management to take. This problem is compounded when links are attempted from the corporate level measures to the different levels of management in the organization, thus weakening the connection of the individual measures have to the company's objectives (Bhargava, Dubelarr, and Ramaswami, 1994).

Lockamy (1991) notes that few companies have plant or individual measurement systems that transfer corporate strategic objectives to the plant or individual level. Lockamy proposes a "customized" system of redesigning corporate objectives in a way such that shop floor goals can be extrapolated from corporate with little difficulty. Unfortunately this requires that each company create a unique set of performance measures that are directly in line with plant and individual contribution and with corporate performance goals in that time period. This creates difficulty in comparing firm performance to peers or benchmark organizations.

Several different types of programs have been introduced to translate organizational goals into performance measurement and feedback systems that can be transferred

to the shop floor level for employees. An overreaching assumption has been made that there must be subsets of objectives in order to motivate shop floor employees. In the field of human resources, performance management systems have been designed as vehicles for goal translation from top management to lower levels. The total quality management literature introduces hoshin planning systems as a formula for disseminating goals between layers within the organization. Hoshin management's stated purpose is the aligning of all layers of employees with the company's goals and objectives (Cowley and Domb, 1997. Management by objectives (MBO) has been considered an individualized version or variation of both performance management systems and hoshin management.

Management by Objectives

MBO is a program, designed to improve productivity, that incorporates goal setting, participatory decision making, and feedback (Rodgers and Hunter, 1991). Here, the focus level is the person and not the company.

MBO is considered a variation of hoshin management. Some consider MBO to be an individualized hoshin (Melum and Collett, 1995). As summarized by Melum and Collett (1995), MBO is designed to impact individual performance while hoshin management is focused on organizational performance. Hoshin uses both results and processes to provide sources of information for improvement, and MBO has a tendency to be more results-only oriented. MBO falls short in being a true example of hoshin planning as it fails to utilize catchball (action planning) (Cowley and Domb, 1997). Hoshin requires the completion of the planning stage, which includes agreement on all strategies, and these strategies must be consistent throughout the organization. MBO does not utilize this step, one that is vital to the hoshin planning process.

MBO is a very specific application of a more generic tool in performance appraisals. It includes some of the steps involved in performance management systems: setting expectations; reviewing progress; and providing reward (McDonald and Smith 1995). As MBO is an individual process, there is a tendency to use individual and not corporate goals as its driving force. Organizational goals provide focus to performance management systems. Another shortcoming of MBO is a lack of commitment to frequent coaching and feedback, an important part of the informational loop required in performance management.

In a meta-analysis of 70 studies on the effectiveness of MBO, Rodgers and Hunter found that 68 reported productivity gains. Twelve studies provided ordinal performance rating data. Also, MBO productivity gains were only fully met with top management participated in the process and gave it their full support. Unfortunately, MBO program participants are usually managers (Mali, 1986) not shop floor workers.

The need to connect employees with corporate goals has led to the development of several management interventions. As an intervention, Open Book Management serves as an example of a management system that links employees and organizational goals. The research questions to be addressed are as follows:

1. What are the basic elements of an OBM intervention and what current system(s) does OBM borrow from, if any?
2. Are employee attitudes influenced by OBM, and if so, which ones?
3. Does OBM impact employee behavior such as absenteeism and turnover?
4. What plant performance indicators are affected by an OBM intervention?

Overview of Study

The remaining chapters of the study are organized as follows. The literature review is found in Chapter II. The research model, hypotheses, and description of study procedures are in Chapter III. Chapter IV includes the statistical analysis of the stated hypotheses, and Chapter V contains a discussion of the findings and suggestions for future research.

CHAPTER II

LITERATURE REVIEW

An investigation of the performance management and hoshin planning literature reveals a number of common elements between these seemingly different systems. As organized in Table I, these elements create a framework needed for the establishment of a chain of knowledge linking corporate goals to shop floor employees. When a link is missing, the transference is weakened or fails to occur.

Table I. Contrasts Between Performance Management, Hoshin, MBO, and OBM

Programs: Common Elements	Performance Management	Hoshin Planning	MBO	OBM
Organizational objectives drive process	Occurs in most recent model	Begins the process		Corporate goals are the only ones used
Participative planning	Limited	Occurs through ladder of abstraction		Occurs once program is in place and learned.
Timely measurement	Limited	Necessary	Individual	Fundamental to success
Create "Review Culture"	Foundation of program	Analysis by fact	Individual	Outcome of program
Utilize goal setting and feedback	Individual goals that may/may not be directly linked to corporate goals	Corporate goals translated into mid-level goals	Individual	Plant level
Training	Train managers on process	Education about goals		All employees receive financial training
Incentives	Limited	Limited	Individual	Group

Performance Management Systems

The concept of performance management is the first systematic approach to linking employees and corporate goals to be examined. Although it began as employee appraisals, performance management has evolved into an interactive process for both the manager and employee. Spector (1996) notes that performance appraisals are useful for decision making in contract employment situations such as the government or union environment, providing information for employee development, and supporting managers in giving performance feedback to employees about job performance and skills. Schneier, Beatty, and Baird (1986) note that, traditionally, performance appraisal systems have not been designed to incorporate managers' responsibilities and corporate cultures. For example, typical performance appraisal systems have lacked agreement on performance criteria. There is also some difficulty associated in being able to actually measure the stated, theoretical criteria. Often, actual criteria suffer from contamination and lack of relevance in terms of the theoretical criterion. Another problem is that objective, quantifiable measures of job performance may be very difficult to obtain. Standards for performance may be chosen because they are measurable but then the appraisal system fails to measure the individual characteristics that determine success for that job.

Improved rating formats and techniques have been developed in an attempt to make performance appraisals more accurate in capturing job performance (Fisher, Schoenfeldt, and Shaw, 1996). Unfortunately, appraisal systems are still plagued with managerial biases. Ferris, Judge, Rowland, and Fitzgibbons (1994) support the notion that managers give better ratings to employees that they like. Not that this is entirely

wrong, as additional research indicates that the preferred employees are typically better performers even by purely objective criteria (Robbins and DeNisi, 1994).

What makes performance management different from performance appraisals? Performance management systems move beyond the appraisal process. McDonald and Smith (1995) describe performance management as having four critical elements of interaction between managers and employees. These elements include:

1. setting expectations--defining what is to be done, when, how and with what results;
2. coaching and feedback--informal discussions of what is going well and what needs improvement;
3. reviewing--formal meeting at least once a year to discuss specific expectations that were and were not met, along with suggested improvements; and
4. rewarding-allocate adjustments or bonuses based on performance results (McDonald and Smith, 1995).

One noted example of a performance management system included steps for planning, managing, reviewing, rewarding, and developing performance objectives (Schneier, Beatty, and Baird, 1987). In a condensed model, McAfee and Champagne (1993) present a three-step continuous process: planning, managing, and appraising performance. Outside of this loop, serving as a driving force, are organizational goals and standards. A comparison of characteristics of the two systems is outlined in Table II.

Table II. A Comparison of Two Performance Management Systems

Schneier, Beatty, Baird:	McAfee and Champagne:
1. Choose objectives (appraisal criteria)	1. Organizational goals and standards (drive the process)
2. Communicate expectations (set goals in a participatory manner)	
3. Plan for successful completion (work with employee to determine how they are going to meet goals)	2. Planning performance (set performance goals, developmental goals, and action plans with employee)
4. Monitor, assist, and control development (provide on-going feedback and coaching)	3. Managing performance (observe and document performance, managers also provide coaching and on-going feedback)
5. Performance appraisal (performance to criteria is documented)	4. Appraising performance (evaluate accomplishments and skills, discuss results with employee)
6. Constructive Feedback (carefully planned, results in an action plan for employee improvement)	
7. Personnel decision are made using the performance appraisal information	
8. Development action plans are implemented from Step 6.	
9. Start again at Step 1.	5. Start again at Step 1.

Initially, both models contain appraisal activities. This idea holds whether this is the employee's first planning session and the initial goals are defined or if it is the end-of-period session where the next period's goals are established and plans are outlined. A relationship between the manager and the employee must then be fostered. Here the manager serves as coach, keenly aware of the employee's performance relative to goals, and providing timely feedback and constructive suggestions for improvement. The

culmination of the first two stages is the actual appraisal, based not on the employee's previous two weeks and the manager's mood, but on an action plan's completion and the successfulness of its supporting activities. The results are communicated to the employee and the process begins again with the establishment of a new plan and set of goals.

One obvious enhancement found in the McAfee and Champagne model is the utilization of organizational goals and standards as a starting point. It appears the absence of this in the first model is unintentional. Baird (1986) uses the business plan as the source of direction for the performance appraisal system. In one example, the strategic direction and subsequent action plans serve as a mechanism to define measures of performance for the employees that are congruent in nature. One weakness is line-of-sight; the employee is so far removed from the corporate goals, such as return on investment, that relevant corporate performance measures are difficult to define at the employee level. For example, the Union Carbide Management System (Baird, 1986) uses action plans stemming from the annual business plan (rooted in the strategic plan) to define the linkage of activities which can be translated to the employee level. What is missing is any evidence that results from lower level action plans do, in fact, have a significant impact on action plans at higher levels in the organization.

Successful firms appear to use corporate goals as the drivers for performance management applications. In McDonald and Smith's (1995) review, firms with performance management system were more likely to have identical or nearly identical goals for both the human resources executive and the rest of senior management, with improving profits being either number one or two for both management groups.

Another difference is that McAfee and Champagne (1993) also keep rewards separate from the development processes. The financial incentives are typically tied to performance appraisals. There is a stream of literature that continues this debate; however, the question of tying pay to appraisals will not be addressed here.

Common to both methods is that the first stage of performance management is also the first stage in implementing the system. The planning stage gets shortchanged in many traditional approaches. The design and implementation of a performance management system really begins at the point that most ignore: the link between organizational goals and objectives and employee goals and objectives. Here action plans from the organizational level are tied directly to employee action plans. This is a significant departure from traditional performance appraisal. In the past, appraisal plans were tied to the success or failure of the employee in performing the essential functions of the job. For example, in planning measurements, Schneier, Beatty, and Baird (1986) make a distinction between behaviorally and competency based approaches to appraisal. In a behaviorally based system, goals are specific, job-related behavior that can be assessed using a rating scale. Competencies and job duties are defined behaviorally. This type of system conducts appraisals based on what people do. Competency based systems are designed around knowledge, skills and abilities along with other personal characteristics that lead to successful performance. It is helpful to define these characteristics behaviorally to reduce subjectivity in rating. However, both of these systems are still limited in focus to the job and the incumbent's ability to perform job-related tasks, not necessarily resulting in the achievement of organizational objectives.

Once measures and standards have been established, employee action plans need to be developed. Communication with employees about each of the components of planning (measures, standards and goals, and action plans) is a vital part of this process. "Negotiation and participation are crucial" (Schneier et al., 1986, p. 76). Communication and dialogue between managers and subordinates is the point of buy in for the employee. It also includes the plan for performance where the manager and employee agree on the action plan and then identify the resources and schedules required for each.

Managing performance is a turning point that separates performance management from the traditional appraisal processes (Schneier et al., 1986). This step includes on-going feedback and monitoring of performance to goals. Constructive feedback is an important part of this process. Often ignored, this part is similar to the concept of inspecting work early in production process and prior to the constraint in order to reduce waste. The earlier a defect is recognized and removed from production, the less added value is wasted on defective products. Similarly, the earlier in the development process employees receive constructive feedback, the more opportunities they have to correct or re-direct their efforts.

The actual appraisal is the next step in the implementation process. Regardless of whether financial incentives are used, formally reviewing and documenting performance results is useful in communicating with employees and preparing future action plans. Following through with the realignment process from organizational goals to employee goals is the final piece of this system. Companies typically maintain consistent measurement systems, but the goals may shift or be redirected. Employee development plans

need to be parallel to the organization's and therefore must be re-evaluated frequently to ensure consistency.

When implementing a new system, such as one for performance management, communication and training is critical. Managers must be trained in each area of the system. Coaching and providing on-going, constructive feedback may be skills that require development for some managers. Both employees and managers will require training on the various components of the system and their shared relationships.

In studying the utility of performance management systems, failures of implementation should also be considered. Schneier (1989) notes six factors attributed to the failure of performance management system implementations:

1. no compelling business or strategic reasons to change;
2. lack of top management support and involvement;
3. lack of integration of performance management with recognition and rewards;
4. no input from, or ownership by, the end user (i.e. first line supervisors and employees);
5. no emphasis on ongoing managing and rewarding of performance; and
6. lack of activities beyond training used in the implementation strategy.

Given that some managers think of performance reviews as an "extra" time consuming task, the economic value of performance management system has long been questioned. McDonald and Smith (1995) found that firms with performance management systems appeared to have better business results. The firms with such programs reported better financial conditions such as higher stock values and performance, stronger cash flows, higher profits, higher sales growth per employee, and lower real growth in workforce size.

An appropriately designed performance management system must respond to the need for consistency of purpose across all levels of the organization. There are several components lacking in the current models for performance management. If organizational goals are translated into individual action plans, a relationship must be established between the level of success in the individual plans and the impact on organizational performance. The complexity of establishing the relationship leads to the issue of organizational levels of analysis. Ostroff (1993) noted that this effect can be considered with varying assumptions. Homology across levels of analysis occurs when the relationship between two variables is the same at both the individual and the organizational level. When the assumption is that there are two different processes in operation, one at each level then the effect is the relationship between two different constructs. When setting up sub-objectives from organizational goals, are these different processes or a homologous relationship? Once the action plans are established, difficulty arises in capturing the effect of the action plans. Given that organizational performance is typically measured in financial terms, there is a lag in influence from the individual action plans and actual performance improvement. Wood, Mento, and Locke (1987) suggest the presence of a time lag, as yet of an undetermined length, for the effect of goal setting on complex tasks such as activities with effects carried over multiple organizational levels. Another complication arises in tracking the influence of each individual project and being able to capture its isolated effect. Limitations in information systems make this level of data difficult to obtain.

Hoshin Management System

Hoshin management is the process, rooted in total quality management, that works to strategically align all activities within the company in direct support of strategic, or breakthrough, objectives (Juran, 1964, Kenny and Florida, 1993). According to Shiba, Graham, and Walden (1993), alignment can occur for three reasons. First, hoshin management works to target all company activities to positively influence company goals. Second, both jobs and tasks are designed to create breakthrough achievements as they are focused on company goals. Third, hoshin management seeks to keep the company's goals in line with the market and environment in which it exists, allowing the company to stay on the leading edge of its industry.

A hoshin or policy, set annually, is a focus statement made up of five elements (Shiba et al., 1993). There is

1. an outcome statement (desired), followed by;
2. the focused methods used to obtain the outcome;
3. the measurements that will capture progress towards to outcome;
4. the standard or desired value for the outcome; and
5. the due date for the outcome to have occurred.

Once the strategic hoshins have been deployed throughout the organization, a series of hoshin subsets emerge with lower level policy goals that are to be in direct alignment with the top level hoshins.

Hoshin management incorporates proactive, reactive, and control stages of problem solving (Cowley and Domb, 1997; Shiba et al., 1993). The third factor in hoshin alignment, the environmental alignment, is its proactive feature. Plan-Do-Check-Act is

the reactive part of hoshin management, where the implementations of hoshins are monitored for implementation. The control phase, also annual, is the part in which the results of each hoshin are monitored for success and also alignment to its goal.

Hoshin deployment requires that the implementations are based on facts and data analysis, that measures are in place to capture performance, and that deployment moves up and down the ladder of abstraction (Shiba et al., 1993). The ladder of abstraction is based on the underlying belief that there is an appropriate level of abstraction to hold a discussion. If one has a discussion using too high of a level of abstraction, one may have acquiescence from everyone in the group, but not have real agreement, since everyone will be confused about what is meant. To have high level discussions, one must first have reasoned from a lower level concept to a higher level concept to ensure that there is agreement and understanding among everyone about the lower level meanings. This is how hoshin management maintains the connection or linkage between levels of the organization.

The ladder suggests that if communication at higher levels is really being understood, then the participants should be able to move down the ladder of abstraction. Various total quality management tools, including the seven problem solving steps are designed to assist in this process (Cowley and Domb, 1997). The seven problem solving steps (Shiba et al., p. 86, 1993) are listed in Table III.

Table III. Problem Solving Steps for Hoshin Planning

Step	
1	Select theme.
2	Collect and analyze data.
3	Analyze cause.
4	Plan and implement solution.
5	Evaluate effects.
6	Standardize solution.
7	Reflect on process (and next problem).

Steps one and two are used in the preparation stage of hoshin planing. Decision by fact is a major element of this process. The second of the seven problem solving steps is "collect and analyze" data (Shiba et al., 1993). This step encourages the group to go down the ladder of abstraction to the level of facts. The third level "analyze causes" also pushes the group to stay at the level of facts. Now part of the intuition of the group is to stay at the appropriate level of abstraction for their task. They do not include inappropriate facts such as the chemical standards for raw materials in the processes when they are considering whether a machine is being installed correctly on a shop floor. Relevant facts would include items such as the electrical and HVAC requirements of the equipment. Steps four through seven further reinforce the use of facts when evaluating effects, and standardizing the solution.

In addition, the seven quality control tools also aid in moving down the ladder of abstraction because they require data. They help the team identify appropriate data and determine the relationship among this data. The data is factual, but inferences about

relationships between the data can be drawn using the tools. For example, a scatter diagram is used to make inferences about the relationships between two variables.

Both the tools and problem solving steps help to prevent a group from moving up the ladder of abstraction too rapidly. The tools and the steps are geared to keep a group close to the factual level until reaching step four, "plan and implement solution," then the steps encourage sharing of judgments and inferences. But, when one plan is selected, the tools and steps again encourage the return to a lower level of abstraction.

The ladder of abstraction can help a firm focus on the customer by requiring facts to make decisions. Often the customer is the only source for these facts. This requires listening to the customer. To listen to the customer, we may have to move from the customer's judgment to facts about what the customer wants. We can do this using the ladder of abstraction.

Elements of Performance Management and Hoshin Planning Systems

Performance management systems and hoshin planning, while developed in different settings, have several shared characteristics. Table IV highlights commonalties between performance management systems and hoshin management.

Table IV. Similarities Between Performance Management and Hoshin Planning

Performance Management System (Schneier, Beatty, and Baird, 1987)	Hoshin Planning (Cowley and Domb, 1997)
Choose objectives (appraisal criteria) using organizational goals and standards (drive the process)	Derives organization's objectives from its vision. Aligns and focuses organization on most important of these.
Planning performance (set performance goals, developmental goals, and action plans with employee)	There is buy in at every level of the organization.
Plan for successful completion (work with employee to determine how to meet goals)	Planning in the Hoshin system is done by those that are expected to implement the plan.
Monitor, assist, and control development (provide on-going feedback and coaching)	Steps in the process are measures at least four times a year; many are measured monthly.
Appraising performance (evaluate abilities and skills, discuss results with employee)	Includes a review system that ties back to implementation.
Development action plans are implemented from previous step.	Plan-Do-Check-Act is a fundamental part of the implementation of Hoshin.

Organizational goals drive the process in both hoshin planning and performance management systems. In performance management systems, organizational goals define the system's objectives. For hoshin planning, a corporate goal is used as the direction for which all levels of the organization find ways to contribute. Goal setting is a fundamental activity of both processes, to transfer corporate goals to the employee.

Both methods use participative planning systems. In performance management, participative planning takes the form of development sessions (feedback) between the manager and the employee. Hoshin planning utilizes action plans (known as catchballs) to engage the employee and also provide feedback. Owners of the planning item are

chosen because they are the closest to the work and to the affected customer base. Neither of these function as a daily management tool. Hoshin planning is traditionally not used for daily management activities, but for breakthrough objectives. Along that same idea, a performance management system is not a day-to-day management technique, but a process for attaining new performance levels for individual employees. In order for participative planning to be effective, training of employees and managers is required.

The measurement of progress is another common element. Hoshin planning evaluates progress based on data. Frequent measurement is provided to the respective level of the organization that is executing the action plan. These metrics are selected in order to measure how well the plans have been carried out and targets met. Performance management provides on-going monitoring and feedback so that employees know what level of progress has been made towards the goal.

Plan-Do-Check-Act and development action plans resulting from the appraisal of previously set goals are the review mechanisms common to both hoshin planning and performance management systems. While a final stage, it is also a critical one. The review mentality of hoshin planning proactively sets the tone for the next set of goals. Performance management allows for an appraisal of the results with the employee. From that, development towards a new goal set begins.

Differences between the two systems are rooted in their purposes. Performance management has been directed at individuals with little regard to organizational goals. Hoshin planning has, as its foundation, the organization's goals and objectives. The recent emergence of teams and work groups has provided a catalyst for performance

management systems to develop group-based goals and objectives. The addition of organizational goals as drivers for setting the objectives, along with team based planning, has eliminated many of the differences between hoshin planning and performance management systems. While their initial purposes were distinct, hoshin planning and performance management utilize a common set of instruments to implement their processes. These include training, goal setting, feedback, and incentives.

Performance Management and Hoshin Planning Systems Tools

Training

One tool, employed by both hoshin planning and performance management, that may aid in transferring organizational goals is training. Training the shop floor employee to increase their understanding of corporate measures and goals and also recognize his or her impact on those measures empowers that employee with a linkage between their action and corporate goals. If the employee can learn how his or her responsibilities influence corporate performance by understanding the intermediate connection up through the department and plant level measures, the employee may be able to see where his or her activities have the most effect.

The concept of human capital serves as a basis for understanding the value of training workers regarding the goals of the company. Performance management systems and hoshin planning attempt to translate organizational goals into individual level objectives. This process leaves open the opportunity for miss-communication and miss-direction due to incomplete translation.

Originally, the human capital perspective was brought forth to assess the economic value of education (Schultz, 1960). However, the idea of human capital may be used to examine other areas including human resource management, in general, and more specific activities such as worker training (Cascio, 1991b). The idea of human capital is essentially that workers acquire knowledge, skills, and abilities, and as a result, contribute more in the transformation process of manufacturing (Parnes, 1984). Snell and Dean (1992) summarize human capital as a three-part concept. First, workers' skills and knowledge should be considered as capital due to their direct link to increased productivity. This is based on the idea that this skill and knowledge will add value to a company in the future. Second, human capital recognizes that labor is a required investment. A company either invests in current workers or hires new workers from the outside. The choice results in both opportunity costs from the one not chosen and direct expenses for the one selected. This investment in the current workers is founded in the belief that it will pay off with greater returns down the road through increased productivity (Duncan and Hoffman, 1981; Rumberger, 1987). This investment is complicated by the ability of the workers to contribute to the company. The greater impact the worker has on the company's performance, the more attractive are investments in human capital, and the greater the potential return or loss (Becker, 1976; Parnes, 1984). Third, human capital investments have a market price because (a) human capital is of value to other companies and (b) human capital can change employers with few barriers to exit (Parnes, 1984). Unlike capital expenditures, such as machinery, companies do not permanently own human capital. Employees must be motivated and willing to perform and increase productivity for investments in human capital to pay off (Flamholtz and Lacey, 1981). For

example, training employees on how to understand financial reports within a company provides them with the knowledge required to assist in setting budgets, self-managing a department, and examining factors on the shop floor that affect impact company performance.

Finally, at any given point in time, any two employees with similar skills are not equally valuable to the company. The employee using the broadest range of skills is the more valuable of the two (Snell and Dean, 1991). Therefore, the human capital investments are "valued" based on (1) the employees' application of the investment and (2) environmental factors present that play a large role in the utilization of a workers knowledge skills, and abilities.

Learning as a result of the productive process is enhanced by on the job training. Workers can improve productivity and fine tune previously learned skills while embarking on new areas of knowledge (Becker, 1964). This indicates that future productivity gains may come at a cost that should be considered as part of the changing demands of the customer. Future learning needs to be geared to the future changes in customer demands so that employees are capable of meeting those needs. This will allow for higher returns on the investment costs of training since it will have a significant impact on the company's ability to compete in the future. Financial training may be considered on-the-job training that is a prerequisite to a versatile employee. As the requirements of the job change, the employees must be able to read and interpret financial information to participate fully in their positions.

Systems such as hoshin planning and performance management require training of employees on how to participate in the processes and on how to use the information

these systems provide. Both methods utilize feedback to the employee of information that can be presented in many forms. This information is useful to the employee only if it can be understood. Educating employees about basic accounting concepts or manufacturing processes in the organization may be necessary to ensure understanding.

As training of workers increases, so does the cost of employment (Becker, 1964). Turnover is one such cost that includes the value of the training investment. The employee is also worth more to the competition. If the skill is transferable to another firm, there is an incentive to other firms to try and acquire the employees with the greatest return. In some cases, the price of labor may increase when training increases. This occurs when the training is valued by other firms. On the other hand, employees with the increased skills that are valued, and rewarded by the company, are less likely to leave.

Not all companies see investment in human capital as a financial vehicle that provides a return (Becker, 1993). No collateral exists and employees are not compelled to stay with the firm for the full payback period. For companies making larger investments in training and skill improvements, it would behoove management to consider methods of increasing employees' commitment to the firm and reducing intentions to quit.

Training has been an occasional but not vital element in the implementation of most hoshin planning or performance management systems. Short-term training of managers is suggested in performance management, to teach them the process. The literature behind the two systems suggests a greater role for training that would assist in their effectiveness.

Goal Setting

For three decades, goal setting has been positively associated in general with increases in worker productivity (see reviews Guzzo, Jette, and Katzell, 1985; Latham and Locke, 1991; Latham and Yukl, 1975; Locke, 1968; Steers and Porter, 1974; Tubbs, 1986). Performance management systems have goals driving the process throughout. Hoshin planning selects the most important objectives from the vision and sets the goal for each level of the organization. A variety of different types of individuals have found goal setting positively related to some aspect of performance. These include sales people (Ivcancevich, 1976), managers (Meyer and Gellaty, 1988), a hockey team (Anderson, Cromwell, Doman, and Hound, 1988), loggers (Latham and Balder, 1975; Latham and Yukl, 1975), clerical workers (Dockstader et al., 1977; Prichard et al., 1987; Yukl and Latham, 1978). Locke, Shaw, Saari, and Latham (1981) note that goals affect task performance through several mechanisms, including "motivating the individual to develop relevant strategies for goal attainment" (p. 145). Effects found to be consistent across studies include goal difficulty, specificity, and participation in the activity of goal setting (Tubbs, 1986). Specifically, Tubbs (1986) found from a meta-analysis of eighty-seven studies that difficult yet obtainable and specific goals were related to higher performance effects. The effect size of goal specificity was moderated by setting, participation in goal setting, and quantity/time goals. Support for specific goals is prevalent (Latham, Mitchell, and Dossett, 1978; Mento, Steel, and Karren, 1987; Pearson, 1987). Mento et al., (1997) found in their meta-analysis a strong, positive relationship between performance and goal difficulty with the observed mean d of .5813 and between performance and goal specificity/difficulty (d=.4441). Feedback also had a positive moderating effect on

hard, specific goals (d=.873). Feedback has been independently linked to productivity improvements in another meta-analysis (Guzzo, Jette, and Katzell, 1985).

The nature of goal difficulty has also been examined. The effect size of goal difficult was moderated by setting, (lab or field study); feedback, and quantity/time goal (Wright, 1990). Wright (1990) reports that from a meta-analysis that 26 percent of the variance in effect size, of the relationship between goal difficulty and performance, can be explained by the way that goal difficulty was operationalized. For different types of goal difficulty, the observed mean was d=.7477 for assigned level; d=.5729 for self set level; d=.3798 for improvement; and d=.2663 for perception. Given the assumption of goal acceptance, a positive linear relationship between goal difficulty and performance is supported (Latham, Mitchell, and Dossett, 1978). Commitment to a difficult goal is increased when goals are public (ΔR^2=.03, p<.05, n=190), are matched with an internal locus of control (ΔR^2=.03, p<.05, n=190), subjects have a high need for achievement (ΔR^2=.06, p<.05, n=190), and goals are self set rather than assigned (ΔR^2=.03, p<.05, n=190) (Hollenbeck, Williams, and Klein, 1989).

The value of participative goal settings has yet to be firmly established. In a frequently cited meta-analysis, participative goal setting rather than assigned goals was positively related to performance and feedback was a moderator for that relationship (Tubbs, 1986). However, when compared to "doing your best" or no goals, participative goal setting results in better performance (Latham, Mitchell, and Dossett, 1978). Goal acceptance is also positively influenced by participative goal setting (Pearson, 1987). Other researchers have found evidence to the contrary. Some (Ivancevich, 1976; Ludwig and Geller, 1997) have found no difference, and others note that assigned goals led to

higher intrinsic motivation (Smalley, Oldham, and Porac, 1987) and performance on personal goals (Button, Mathieu, and Aikin, 1996; Earley and Lituchy, 1991).

The relationship between complex task performance and "difficult, specific" goals is still emerging. Goal setting has been shown to have a limited effect on performance of novel, complex tasks that require more attention and effort (Kanfer, Ackerman, Murtha, Dugdale, and Nelson, 1994; Wood, Mento and Locke, 1987). DeShon and Alexander (1996) found that while "difficult, specific" goals do not improve performance on complex tasks, specific goals do improve complex task performance when coupled with explicit task processing.

Incentives, however, have been noted to operate separately of goal setting (Terborg, 1976). The interaction been goal setting and pay has also been explored. Lee, Locke, and Phan (1997) found that when workers that were enticed with bonuses found out that they would not be able to meet their hard goals, performance dropped. Personal goals and self-efficacy mediate the goal-pay interaction. The effects of easy vs. medium goals ($F=8.71$, $P<.005$) and piece vs. bonus incentive are greatest when easy goals are paired with piece rate plans and medium goals are paired with a bonus.

Latham and Locke (1979) identify several factors that play a role in the effectiveness of goal setting. Training is a key element in Latham and Locke's model. Knowledge training and skill development with regards to actions needed to meet the goal are elements that affect goal success and goal acceptance, respectively.

Group performance may also be enhanced by goal setting (Becker, 1975). Dyads had higher levels of goal acceptance and performance when they set individual and group goals instead of only individual goals on a speed test (Matsui, Kakuyama, and Onglatco,

1987). Group and individual goals, when used together, have been found to result in higher performance than just individual goals when the tasks require people to work interdependently (Gowen, 1985; Mitchell and Silver, 1990). When compared to no goals at all, the combination of individual and group goals led to performance increases (31%, $p<.01$) that was significantly higher than either group goals (12%, $p<.05$) or individual goals (19%, $p<.001$) alone (Gowen, 1985). Whitney (1994) found similar results. Using a productivity measurement system that allows group level, aggregated measurement of performance, Pritchard, Jones, Roth, Stuebing, and Ekeberg (1988) found that goal setting has a positive effect to group productivity. Regardless of material flow policy, group goals and feedback resulted in increased productivity ($H=41.50$, $p<.000$) (Doeer, Mitchell, Klastorin, and Brown, 1996). Groups that have received negative feedback on a task set higher goals and performed at higher levels on a second task than groups that received positive feedback (Mesch, Farh, and Podsakoff, 1994).

Not all of the evidence points to a positive relationship between group goal setting and performance. Group set goals tend to be less difficult than self set goals for individuals (Hinsz, 1995, Larey and Paulus, 1995) and performance is lower than assigned group goals (Hinsz, 1995).

Goal setting research is scarce at the organizational level. Smith, Locke, and Barry (1990) report that the organization's planning quality and performance were positively related to setting specific organizational goals. Goal setting is a critical element in the successful implementation of either Hoshin planning or performance management systems. Hoshin typically uses a corporate goal translated into a mid-level goal.

Performance management derives, from organizational goals, individual goals that are used to develop an annual plan.

Feedback

Feedback is well accepted as a source of positive influence on individual performance. It is an integral part of the development stage of performance management. Providing on-going feedback and coaching relevant to the performance goals and action plans is an important part of progress towards such goals. Hoshin planning requires regular feedback, at least monthly, and the metrics established at the beginning.

Ammons (1956) describes feedback as knowledge of performance, and indicates that providing timely feedback is an essential function for most managers. The effect on performance was noted across several studies as positive for individuals (e.g., Ammons, 1956; Ilgen, Fisher, Taylor, 1979; Guzzo, Jette, and Katzell, 1985; Nadler, 1979). The influence of specific feedback methods is widely varied. Pritchard et al., 1988 noted that feedback research had developed in three directions: (1) the successful design of feedback systems (mechanisms); (2) the effect of mediator variables facilitating the relationship between feedback and performance; and (3) the effect of moderator variables on the various feedback mechanisms.

Matsui, Okada, and Inoshita, (1983) found that feedback improved performance when it indicated that the receiving individual was below standard. There was no effect when feedback indicated that the individual was meeting the objectives. In their meta-analysis, feedback was found to improve performance (d=.41). However, in over 200 cases, feedback actually had a negative impact on performance (Kluger and DiNisi, 1996). This supports the findings by Guzzo et al., (1985) that feedback effects are

moderated by the nature of the task (novel versus familiar) and that the focus of the task moderates the effects of feedback on performance (Kluger and DiNisi, 1996). Time may also impact feedback's influence on performance. Over the course of a 2.5 year period, a study of 92 managers found that performance improvements were unrelated to any variations in the feedback program (Reilly, Smither, and Vasilopoulos, 1996). Chhokar and Wallin (1984) found that the frequency of feedback, either once a week or once every two weeks, did not influence performance. This finding is similar to that reported in Ilgen et al., (1979).

Types and sources of feedback also have an effect on performance. Feedback has long been considered a critical element in the relationship between performance and goal setting (Shikdar and Das, 1995). Earley, Northcraft, Lee, and Lituchy (1990) report that process feedback as well as outcome feedback interacted significantly to improve performance. Greller and Herold (1975) found that the closer the source was to the individual (the more intrinsic), the more important the feedback. An example of a close source would be direct feedback from the task itself. The further away the source of the feedback is from the individual, the more external it is, and subsequently the less value the information provides. The content and source of job performance feedback can also impact its effect (Greller and Herold, 1978). Greller (1992) notes that when individuals receive supervisory feedback on performance and feedback from the task (which is more intrinsic), individuals held the supervisors' feedback as more important. This is of particular importance when feedback is linked to conditions for advancement. Self generated feedback combined with goals setting was found to have a bigger impact on performance than externally generated feedback and goals setting (Ivancevich and

McMahon, 1982). When individuals receive feedback about their own performance along with the performance of their comparison group, the individuals perform better than the comparison group that only received their own individual feedback (Siero, Bakker, Dekker, VanDenBurg, 1996).

Some research indicates that feedback also has a positive effect on performance when applied in a group setting (Becker, 1978) even influencing group productivity (Pearson, 1991). Groups with difficult goals and feedback outperformed all others including groups with easy goals and feedback (Becker, 1978). Pearson (1991) found that group level, extraneous feedback had a significant, positive effect on group productivity of maintenance workers. Group performance feedback positively impacted performance but in a level less than individual feedback (Emmert, 1978). A group feedback intervention in departments of a retail store significantly raised overall group productivity (R^2=.38, p<.016) (Jones, Buerkle, Hall, Rupp, and Matt, 1993). Tindale, Kulik, and Scott (1991) report findings to the contrary. In a study utilizing both group and individual feedback, neither type of feedback influenced group performance. Individual performance was significantly influenced by both types of positive feedback, individual and group. Smither, Wohlers, and London (1995) found that for team leaders, that view individual feedback more positive than group, there was no difference in the effect on performance between aggregate or individual feedback.

Frequent feedback, along with coaching, is the follow up step after goal setting in performance management systems. Employees receive information regarding their progress towards the objectives. Decision by fact is integral to Hoshin planning. The process mandates at least monthly feedback, and ability to measure objectives in order to provide

such feedback is one influence that helps determine which goals are selected to pursue. In both systems, information at the group level is most often provided; although performance management should provide individual feedback when the goals are at the employee level.

Incentives

The use of incentives and rewards to enhance performances is frequent and historically far reaching in the literature. Many different incentive systems have developed in the attempt to share the wealth and provide motivation to employees. Taylor, the father of scientific management, is credited with the creation of the term "gainsharing" (Band, Scanlon, and Tustin, 1994). Gainsharing is an incentive plan that rewards employees by the overall effect they have on the profitability of the firm. The reward formulas are typically quite complex and difficult for the rank and file employee to comprehend. Scanlon plans are incentive plans that focus on organizational cost reduction, while Rucker incentive plans seek out value adding activities (Band et al., 1994). Research indicates that when incentive systems are correctly designed, both financial and non-financial incentives may increase performance (Guzzo, Jette, and Katzell, 1985).

Moving from individual to group based incentive systems has shown positive results. The effects of transferring from an individual piece rate system to a gainsharing bonus plan were monitored over a four-year period (Hatcher and Ross, 1991). The reductions in total grievances filed, non-incentive grievances, and product returns over the four-year period were all significant. Participation in the company profit sharing plan has been linked to increased organizational commitment in workers (Florkowski and Schuster, 1992). Quality and productivity have also been improved after the

implementation of group bonus systems that are based on plant wide goals (Hatcher and Ross, 1991).

Organizational incentives based on improvements in division level sales, expenses, and absenteeism have enjoyed positive support from employees and resulted in improvement in most areas (Petty, Singleton, and Connell, 1992). A perception of fairness must be present in order for organizational incentives to drive improvements. Cohen and Gattiker (1994), in a meta analysis to examine the relationship between rewards and organizational commitment, suggest that organization size and an individual's level in the organization impact their feelings about reward systems. While organizational level did not have an impact on the relationship between commitment and pay satisfaction, private organizations had stronger relationships between commitment and pay than the public sector.

The effects of some incentive plans have been found to continue after the plan has been discontinued. In a field experiment capturing the effects of the withdrawal of a gainsharing program, positive employee attributes such as communication and commitment continued to improve for more than a year after the plan was eliminated (Hanlon, Meyer, and Taylor, 1994). In a review of pay for performance systems, Latham and Huber (1992) note several factors that influence the effectiveness of these programs. Dickinson and Poling (1996) reexamined Latham and Huber's (1992) review. Their reevaluation of the studies led them to declare the evidence inconclusive. The use of incentives with performance management systems has been limited. The question of whether reward programs should be used in conjunction with performance management

systems is still being debated. Hoshin planning does not utilize group or individual incentives in a formal manner.

CHAPTER III

RESEARCH DESIGN

Open Book Management

Creating a competitive advantage in the marketplace through training of employees is a primary objective for implementing open book management. The designers of open book management (OBM) claim to directly impact the profitability of the company by investing in its worker through training and creating an environment in which working is a more enriching experience.

Open Book Management (OBM) is one method that is designed to correct for some of the deficiencies noted in performance measurement and hoshin management. Its response to their limitations is summarized in Table V. OBM consists of three basic interventions. First, OBM companies must teach their employee how to read, understand, and use the financial information about the company. In this study, the training objectives are that the employee be able to read and interpret an income statement and balance sheet. Second, employees must understand that they are just as responsible as anyone else for moving the company's critical number(s) towards the goal. This will be established through a system consisting of monthly goal setting and feedback for each plant that will reflect their critical number(s) and goal(s). Third, employees must have an increased stake in the company. Typically, companies distribute the additional gains in profits as bonuses to the employees, after some reinvestment for improvements. For example, a bonus system with a quarterly payout is commonly used. The employee

would receive a percentage of the profits in the pool directly proportional to the percentage their salary was to the total compensation pool. If that employee's salary was one percent of the compensation pool, then they receive one percent of the total funds in the bonus pool.

Table V. Limitations of Performance Management, Hoshin Planning & OBM's Response

Programs: Limitations:	Performance Management	Hoshin Planning	OBM's response
Corporate objectives do not drive process	✓-not always		Corporate goals are the only ones used.
Failure to use participative planning	✓-limited	✓-led by management	Regularly scheduled "employee huddles" place planning responsibility on employees.
Review culture imposed onto employees	✓-system imposed	✓-system imposed	Review culture is an outcome of program, continuously improving.
Fail to utilize meaningful goal setting and feedback	✓-goals may not be linked to corporate objectives	✓-mid level goals	Weekly feedback is fundamental to program. Plant level goal setting is focus of program. Critical numbers define measurement.
Lack of training	✓-training about processes only	✓-limited	All employees receive financial training relevant to the goal
Lack of incentives	✓-limited	✓-none	Everyone participates in a bonus program tied to the goal.

Four of the books describing the OBM phenomenon clearly illustrate the potential for this type of system (Schuster, Carpenter, and Kane, 1996; Stack and Burlington, 1992; Case, 1995b; and Case, 1998). Recent research in the area of intellectual capital indicates that the most valued assets in a firm are those employees who are both skilled and committed to the goals of the company (Ulrich, 1998). Training and goal setting are two elements necessary to use OBM in a company, and they relate to the issues of competence and commitment.

OBM has captured the attention of a broad range of companies yet still needs to be empirically examined. What began as a way to combat hostile employees in a debt-laden company has become a technique for creating employees that behave as owners (Lee, 1994; Stack and Burlingham, 1992). OBM actually began at the Springfield Remanufacturing Corporation (SRC) with the arrival of Jack Stack when the company was still Springfield Renew Center, a failing division of International Harvester (Lee, 1994; Rhodes, 1986; Stack and Burlingham, 1992). In 1983, 13 managerial employees, including Stack, purchased the facility from International Harvester when it had a debt to equity ratio of 89 to 1. Since then, sales have grown at record rates and, no longer laden with debt, the company expands through starting new divisions with new product ideas, including the one that markets OBM.

The principles of OBM are really quite simple and have been outlined in several articles (Case, 1995; Lee, 1994; Rubis, 1995). The objective is to get every employee directed towards helping the company achieve its objectives. Although there are no official guidelines to this concept, there are certain activities that are consistent across companies that have implemented this program are presented in Table VI.

Table VI. Open Book Management Characteristics and Operationalization

Characteristics of Open Book Management	Operationalization of OBM Characteristics
1. Financial Training conducted for all employees	Upon completion of course, an employee is able to complete an income statement and balance sheet for a given period based on production for that period using Throughput Accounting terminology.
2. Focus employees on improving the critical number (or numbers) through feedback and goal setting.	Critical numbers are the measures by which the divisions are evaluated
3. Provide a stake in the outcome (employee ownership or bonuses)	Annual bonus for each employee, paid quarterly, if critical numbers are met.

A major portion of OBM's intervention is implemented through financial training and the provision of weekly performance information. OBM provides both intrinsic and external feedback. Simple measures, such as performance to machine standard, are tracked and posted by the machine. More external measures, such as weekly net profit, are also posted in the same way in a more general location. The key to making both measures intrinsic is the training the operator receives. The machine operator learns the relationship between machine standard time and the pricing of the product that the company sells. The operator should realize that the lower the standard goes, the more competitively the company can price the product.

Financial Training

The strategic importance of employee knowledge is highlighted in Bartlett and Ghoshal's (1994, p. 80) reflection that "the scarcest corporate resources are less often the financial funds that top management controls than the knowledge and expertise of the

people on the front lines." The authors also assert that for a firm to find purpose and ambition in the organization's strategic focus, the organization must (1) capture the employee's attention and interest, (2) get the entire organization involved in setting the focus, and (3) create momentum towards reaching the corporate goals.

Kirkpatrick (1959, 1994) proposes an evaluation of training based on a four level, progressive system. The four levels of evaluation are

1. reaction,
2. learning,
3. behavior, and
4. results.

Reaction evaluation captures the participants' satisfaction with the training and does not indicate whether learning occurred. The second level, learning, typically involves taking a post-test when the training is complete. Behavior evaluation is based on the perspective that training was not effective unless behaviors change. Kirkpatrick (1994) notes that for behavior to change not only must the person want to change, they must also know what and how to change. Training provides the what and the how, and can also increase the desire to change. Organizations must provide a positive environment where positive change can occur and then provide a reward for the change in behavior.

Rubis (1996) notes that one key to implementing OBM is providing incentives for making the company's financial targets. In general, OBM companies share the increased profits as rewards for reaching the goal. Some firms use a variable component in addition to base pay that is distributed quarterly based on the division's ability to meet their goals (Stack, 1992). At SRC, which has been operating under OBM for over 10 years,

employees propose the bonus based on what they think is best for the business. They are asked by management to consider the long-term impact of how they spend profits: bonus, pay increases, capital expenditures, investment in employee stock program, etc. Employees behave as stakeholders because they are—employees receive part of their incentive pay as stock in the organization.

It has been argued that the financial information that OBM is trying to teach is too complex for the average worker (Falconi, 1995). Another limitation suggested is that workers are unable to change their perspective from self-preservation to the greater good of the company. These ideas find modest support in the literature that highlights the need for a more thorough study to examine the effects of this intervention.

The information used in the financial training, feedback, and goal setting relies on company information. One potential problem area could be employee feelings of distrust of the company or the information it provides. If the employees do not have any confidence in the financial information or measurements, then the effect of goal setting and feedback is diminished. Research has noted that trust in the organization must be present when implementing workplace reform (Nigro, 1981). One such study found that organizational trust was positively associated with human resources reform initiatives (Condrey, 1995).

Organizational commitment, perceived organizational support, empowerment, and job involvement are four worker attitudes that should be impacted by these techniques. Other characteristics, such as role conflict and role ambiguity, have emerged as factors in job enrichment models that could capture the effect that organizational change would have on employee attitudes. Employee outcomes of interest to most firms are

absenteeism and employee longevity. Improvement in plant performance should be seen in a wide variety of productivity and quality measures. Figure 1 illustrates the relationships this study will examine.

Employee Attitudes

An attitude is considered a reflection from a number of responses or actions, not from a single act (Green, 1954). Fisher (1982) notes attitude can be conceptualized by a tendency to evaluate and respond to social objects in a consistently favorable or unfavorable manner. Attitudes are generally considered to contain three factors: cognition, emotion, and action. Employee attitudes are widely researched and many approaches to modifying employee attitudes are undertaken by organizations due to the anticipated effect of attitudes on work place behavior (Cascio, 1991b). Many of these interventions fail because they fail to address all three elements of attitudes.

While attitudes are generally considered to be learned characteristics, research on job satisfaction has supported the idea that attitudes are relatively stable and consistent within the individual, making it relatively difficult to influence change with regard to an employee's attitudes (Staw and Ross, 1985). However, there is considerable evidence that various organizational factors, such as pay systems, goal setting, and work redesign, are even more powerful (Pfeiffer, 1998).

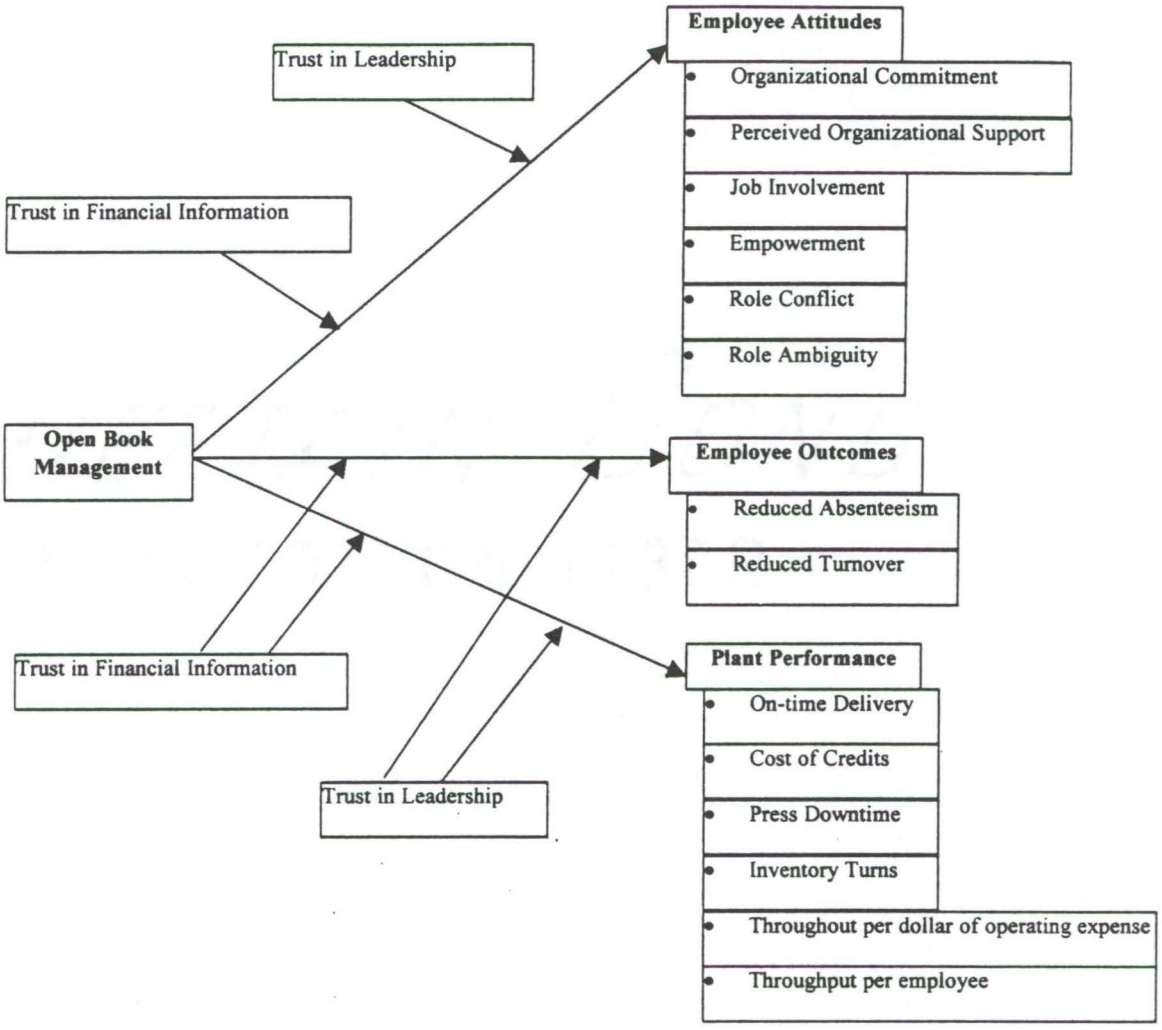

Figure 1. Model of the Effects of Open Book Management

Organizations attempt to affect lasting change in employee attitudes in order to gain improvements in employees' beliefs about their work through various organizational development techniques. In the case of open book management, the idea is that as a result of the intervention, employees will be more productive and, therefore, make the firm more profitable. OBM uses a multi-level approach to change that leads a firm to a more democratic and participative environment. Management plays an active role in this "work style" and employees participate directly in the process. This occurs through employee huddles, frequent feedback and dialogue between managers and employees, an overwhelming belief in management that work should be fun, and the implementation of a relatively simple gainsharing formula. Cognition, or employee beliefs about the organizational factor related to the attitude, is influenced by management's actions while practicing open book management. People tend to believe what they see. An emotion, the favorable or unfavorable feelings an employee has regarding the object of the attitude, is impacted by the atmosphere generated by the nature of the intervention. OBM uses employee games, quick wins, and cheerleading in general by the management team to present a positive surrounding. The third element of an attitude, action, or behavioral predisposition, is a tendency to respond in a particular manner. OBM makes it "easy" to respond positively by creating many opportunities for employees to get involved using huddles and participative goal setting. Training on the financial information provides the employee with the needed information to participate equally. Therefore, the first hypothesis is as follows:

H_1: The implementation of OBM will have a positive effect on employee attitudes.

Organizational Commitment

Organizational commitment is the most prominent worker attitude addressed in the organizational behavior literature (Dunham, Grube, and Castaneda, 1994; Mathieu and Zajac, 1990; Meyer, Allen, and Gellatly, 1990). Organizational commitment is defined as "the relative strength of an individual's identification with and involvement in a particular organization. Conceptually, it can be characterized by at least three factors: (a) a strong belief in and acceptance of the organization's goals and values; (b) a willingness to exert considerable effort on behalf of the organization; and (c) a strong desire to maintain membership in the organization" (Mowday, Porter, and Steers, 1982, 27).

The value of organizational commitment to both employee and employer makes this construct of interest to the present study. OBM contains several elements that should contribute to an employee's commitment to the organization. Cognition regarding organizational commitment should be positively influenced by management activities that increase worker involvement in shop floor goal setting and work cell management. These include training workers and providing necessary information in order for employees to make budget recommendations and participate in goal setting for the department, exchanging information on a frequent basis about performance within the work cell, and increasing the employees' knowledge about the state of the company through scoreboards. Workers should feel more positively about the firm and more willing to work as they receive quarterly bonus checks for achieving productivity goals. As management shows a greater commitment to employees through huddles and training, employees should respond with a greater tendency to stay with the organization because

it is perceived to be a better place to work than the alternatives. The hypothesis for this variable is as follows:

H_{1a}: OBM will have a positive effect on organizational commitment.

Perceived Organizational Support

"Social support...is a flow of emotional concern, instrumental aid, information, and/or appraisal (information relevant to self-evaluation) between people" (House, 1981, 26). Subjective or perceived support is indicated by the amount of emotional support received from others (House, 1981). From a social exchange perspective, the relationship between the organization and its employees results from the unobstructed collection of transactions that develop into expectations of action on both sides of the interaction (Blau, 1964). Emotional support may be provided in an organizational setting through work-related sources such as supervisor and co-worker support. The organization is more than just a work environment. It is also a social one where individuals spend up to half of their lives. Emotional support, from co-workers and supervisors, help to determine the individual's perception of the organization (House, 1981). The perception of organizational support clearly influences an employee's affective reactions to the organization. According to Eisenberger, Huntington, Hutchison, and Sowa (1986) employee perceptions of organizational support are based on "global beliefs concerning the extent to which an organization values their contributions and cares about their well-being" (p. 504).

The construct represented by perceived organizational support involves the employee's perception or cognition regarding their relationship with the organization. The elements of OBM should raise the employee's knowledge about that relationship.

The attitudinal element of emotion should become increasingly positive as employees find the organization supporting the positive results of being a member of the organization. As both monetary and training rewards increase, employees should feel more positive about how their organization cares for them. The employees' tendency to behave in a supportive fashion is reinforced by the organization's support of their ideas and feedback using huddles and employee participation in setting departmental and organizational goals. OBM uses financial training, employee huddles, and participative goal setting to reflect their valuation of employees. Financial training helps employees understand how they can impact the bottom line, and therefore, their bonus check. Employee huddles utilize communication between managers and employees to identify and implement opportunities to improve the operation of the firm. The organization that offers this capability by implementation of OBM should be viewed as supportive of its employees. The hypothesis for this variable is as follows:

H_{1b}: OBM will have a positive effect on perceived organizational support.

Job Involvement

Job involvement is a situational factor that is considered a powerful influence on productivity (Lodhal and Kejner, 1965; Randall and Cote, 1991). Kanungo (1982) makes the distinction between work involvement and job involvement. Work involvement is considered a "generalized cognitive (or belief) state of psychological identification with work," given that work has the inherent ability to meet an individual's relevant needs and expectations (Kanungo, 1982, pp. 79-80). Job involvement is the belief an individual has about a specific job and is descriptive in nature (Kanungo, 1982).

Several components of OBM contribute to an increase in an employee's connection to his or her job. Financial training in small groups gives each employee the opportunity to understand how their job contributes to the bottom line. This training focuses on each department and its impact on manufacturing costs. Business games, used to focus employees on the critical numbers, are designed to provide as many positive outcomes as possible. Small group huddles provide a forum for the exchange of improvement ideas among the employees in each department. Employees use job specific knowledge to change processes to improve both quality and cost in manufacturing. Feedback from these activities helps to strengthen the connection between employees and their jobs. The hypothesis for this construct is as follows:

H_{1c}: OBM will have a positive effect on job involvement.

Empowerment

Empowerment has become a very common term in management. In the literature, the concept is still undergoing intense examination as researchers search for a clear definition. Conger and Kanungo (1988) conceptualize empowerment as a process that increases feelings of individual effectiveness (self-efficacy). Their model begins with conditions that lead to powerlessness, which leads to various managerial interventions that (1) remove the conditions that create powerlessness and (2) develop activities that provide self-efficacy information. This then leads to feelings of empowerment in the employee that drives the resulting empowered behaviors. The managerial techniques identified by Conger and Kanungo (1988) include interventions such as goal setting, feedback, job enrichment, and competency-based reward systems. Thomas and Velthouse (1990) see empowerment as the motivational content of this paradigm,

specifically increased intrinsic motivation, and four task assessments (cognitions) serve as the basis for empowerment: sense of impact (individual's ability to influence outcomes), competence (self efficacy), meaningfulness (value of work task), and choice (individual's perception of having a choice in actions) (Spreitzer, 1995; Gagne, Senecal, and Koestner, 1997). Spreitzer (1995, 1996) conceptualizes empowerment as a psychological construct and that Thomas and Velthouse's (1990) four-task assessments are the four dimensions of empowerment. Others have simply made empowerment a component of participation (Marshall and Stohl, 1993).

Hayes (1994) devised the Employee Empowerment Questionnaire (EEQ) to define empowerment as the employee's perception of their level of authority to act within their work environment. This definition is consistent with other standards used in the implementation of quality systems within an organization. The reliability of the EEQ was assessed using Cronbach's alpha. The first sample included 111 full time employees and resulted in an α=.85, in the second sample of 647 federal government employees reported an α=.94 (Hayes, 1994).

Empowerment is a reflection of employees' perception of their authority to enact change and is consistent with the employee involvement needed to implement OBM. This perception of authority should increase as process improvement activities occur during an open book intervention. The belief an employee has about empowerment is increased as employee ideas are implemented. Financial training provides knowledge about how each department and individual in that department contributes or detracts from the bottom line. This training is then used during the budget development meetings held with each department and the controller. In addition to the budgeting process, OBM

utilizes employee participation in goal setting activities annually for the critical numbers. One would expect OBM to make employees feel more empowerment. Therefore, the hypothesis for this relationship is as follows:

H_{1d}: OBM will have a positive effect on empowerment.

Role Ambiguity and Role Conflict

Role ambiguity is said to be the lack of perceived role clarity in an individual's work tasks or responsibilities, whereas role conflict is defined as the individual's perception of conflict among role requirements (Rizzo, House, and Lirtzman, 1970). Role ambiguity and conflict tend to be negatively related with more direct rather than indirect leader-subordinate interactions (Rizzo et al., 1970).

From their study of cellular manufacturing, Huber and Brown (1991) suggest examining these role characteristics as attitudes that will result from enrichment of the job. The purpose of including role ambiguity and conflict is to better capture how organizational interventions affect employees. They went on to postulate that these attitudes would need to be evaluated in the context of such output measures as turnover, absenteeism, and performance. This approach may lead researchers to uncover more information about how employee attitudes influence profitability (Huber and Brown, 1991; Huber and Hyer, 1995).

The information provided as part of an OBM intervention is performance driven, and is used in departmental huddles on a daily or weekly basis. Employees are provided with insight into how their work contributes to the firm's performance. Clarification of roles and consistent job requirements are the result of employee knowledge about their work gained in training, employee participation in huddles, and more open

communication from management. This intervention is synchronized so that expectations of employees are consistent and in the same direction. The intention is for this information to be used by the employee to better perform his or her job duties. One would expect OBM to inversely affect role ambiguity and role conflict. It seems logical that this activity would lead to the following hypotheses:

H_{1e}: OBM will have a negative effect on role ambiguity.
H_{1f}: OBM will have a negative effect on role conflict.

Employee Outcomes

Employee attitudes influence firm performance in subtle ways. The impact of employee behaviors or outcomes is less subtle and just as valuable to the firm. Employee behaviors such as absenteeism and turnover impact the bottom line through increased labor costs and reduced productivity. OBM raises employee awareness of how their behavior impacts the firm's profits and the overall health of the firm. Quarterly bonuses also encourage employee participation. The higher level of participation should bring about lower absenteeism and reduced turnover. Therefore, the second hypothesis is as follows:

H_2: The implementation of OBM will have a positive effect on employee outcomes.

Absenteeism

Absenteeism is an employee behavior that is influenced by both factors that are work related and others that are not. Assuming that the worker has the ability to attend, workers have varying degrees of attendance motivation (Steers and Rhodes, 1978). OBM stands to increase attendance motivation by showing how costly absenteeism is to the

firm, and thereby affecting the employee's bonus along with firm profitability. Ability to attend must be addressed and isolated. Factors influencing attendance motivation would then be the employee's feelings about his/her job situation and work environment. Job content variables, such as job scope, job level, and role stress, have generally been found to positively affect attendance (Mowday, Porter, and Steers, 1982). Cordery, Mueller, and Smith (1991) found that self-directed work teams alone did not affect absenteeism. In their study, external events such as longer commuting distance and high levels of overtime were experienced by the plant with work teams and appear to have negated any gains in absenteeism created by work teams. Gains in absenteeism can also be program specific. Absenteeism was directly and positively affected by the use of a flexible scheduling system (Dalton and Mesch, 1990). OBM allows for group peer pressure to exert itself during huddles. Here the department has the opportunity to choose attendance as a sub-goal if they find it directly affects profitability.

During an OBM intervention, departments within the organization begin to see how reduced productivity affects profits. Factors influencing productivity are discussed during training and huddles. This typically focuses on things the employee can control and avoids external factors such as machine run rate that are independent of the operator. Requiring attendance is one way the group can influence its productivity quickly and easily. It can choose attendance as a goal and peer pressure takes over where management leaves off. Some may even choose to tie attendance to the bonus. The hypothesis for this variable is as follows:

H_{2a}: OBM will have a positive effect on employee absenteeism.

Turnover

The results of employee turnover, at the organizational level, cannot be classified without investigation as completely "positive" or "negative" (Mowday, Porter, and Steers, 1982). Mowday et al., (1982) summarize the positive and negative consequences of turnover at the organizational level. Positive consequences of turnover may include increased overall effectiveness, employee innovation, motivation, and morale. The negative consequences of turnover may include increased administrative costs (in terms of selection, recruitment, training, development, and administrative staff), employee demoralization, negative public relations, operational disruption, and decreased effectiveness (Mowday et al., 1982).

At the individual level, there are additional costs associated with leaving the company. For the employee the costs of leaving include loss of seniority and non-vested benefits. Mowday et al., (1982) suggest that as the time a person works for a company increases, the costs associated with turnover increase. For the departing employee, changing jobs can also be a significant source of stress and upheaval in social relationships (Mowday et al., 1982). For the employees left behind, workloads may temporarily increase because they have to assume the responsibilities of the employee who left. If the employee that leaves has been a satisfactory performer, the workload increase may be even more difficult for the remaining employees to handle effectively.

Employees gradually make decisions about turnover based on their perceived fit with the organization (Lee and Mitchell, 1994). The information provided by a program such as OBM is useful to employees in determining organizational fit through the goal setting and feedback processes. OBM increases the employee's knowledge about the

firm and its goals. These goals should be ones with which employees can identify. Employee huddles as well as quarterly bonuses should assist in improving an employee's perceived fit with the firm. Financial training provides an opportunity for the employee to feel more confident about their relationship with the firm and its long term health. This should result in a favorable change in turnover. The hypothesis for this variable is as follows:

H_{2b}: OBM will have a positive effect on employee turnover.

Plant Performance

Plant performance measures need to be directly related to the goals of the firm and useful to the managers and employees that report them. Performance measures must be relevant to those that use them and must lead those same individuals in the right direction, where the business should be heading (Maskell, 1991). OBM includes the vital few measures that fit the firm's strategy and are typically profit focused. Frequent monitoring and posting of these measures in an accessible area is a key part of the intervention. Moving these numbers positively drives the bonus payout. The third hypothesis is as follows:

H_3: the implementation of OBM will have a positive effect on plant performance.

On-Time Delivery

Customer service level is one of the key measures for world class manufacturers (Haskell, 1991). One element of customer service is on-time delivery. In JIT performance systems, on-time delivery is one of the critical elements (Crawford, Cox, and

Blackstone, 1988). Performance measures need to fit with the firm's strategy. Time is frequently seen as a competitive advantage for make to order firms.

Shop floor employees have many opportunities to directly impact on-time delivery. Unfortunately, most firms fail to report what delivery performance is other than the due date on the shop order. OBM not only makes employees aware of delivery performance, it helps them understand how an incremental improvement can positively impact profits and lead to their quarterly bonus. Therefore, the first of plant performance hypotheses is as follows:

H_{3a}: OBM will have a positive effect on plant on-time delivery.

Cost of Credits

Quality is the second element in customer service level for world class manufacturers (Haskell, 1991). It is also a critical element in JIT systems (Crawford et al., 1988). It is somewhat more difficult to operationalize than delivery performance. Cost of credits, or the dollar value of returned product for a given time period, is one method. However, this fails to capture the loss of confidence at the consumer level upon receipt of substandard product.

Employees may directly affect product quality either by making it defect-free in the first place, or by catching defects in the product due to previous operations, substandard raw materials, etc. Again, the impact of poor quality on the firm's performance is not always reported to those getting the product out the door. Through OBM's financial training, employees learn some of the tangible costs associated with poor quality, such as cost of credits. Since cost of credit reduction is a critical number, it is a focus of employee huddles. During huddles, employees contribute ways to reduce and prevent

returns, rework and scrap--other associated costs of quality. Therefore, the next hypothesis is as follows:

H_{3b}: OBM will have a positive effect on plant cost of credits.

Press Downtime

The company manages the shop floor using theory of constraints (TOC). TOC exploits the constraint in order to meet its goal to maximize throughput. This occurs through constraint exploitation, bottleneck management, and drum-buffer-rope scheduling. Constraints may be either internal or external. There are six categories or sources of constraints mentioned most frequently in the literature. They are capacity, material, market, logistical, managerial (policy), and behavioral (Stein, 1993; Umble and Srikanth, 1990). External constraints include market demands and material constraints. Marketplace demands provide the limits for system throughput. In the short run, examples of material constraints are a missed delivery or defective materials, and a long run material constraint might be marketplace shortages. Capacity, logistical, managerial, and behavioral constraints are typically internal in nature. A capacity constraint can exist when there is insufficient capacity at the resource to meet desired demand (Umble and Srikanth, 1990).

A constraint that is embedded in the planning and control system is considered a logistical constraint and may be quite difficult to change. Umble and Srikanth (1990) note that logical, managerial, and behavioral constraints, although typically unnoticed, are often responsible for disturbances which are blamed on material and capacity constraints.

OBM is being implemented to overcome behavioral constraints. Behavioral constraints can be thought of as common shop floor employee actions that although well intended may lead to loss of throughput. Examples include setup savings without regard to throughput effects, "keep busy" attitudes, and selectively choosing jobs in the queue instead of running what is scheduled next (Stein, 1993; Umble and Srikanth, 1990). The OBM intervention should focus employee thinking towards the financial impact on the company of their daily activities and decisions. For example, an employee might be manipulating the schedule to save setup time without regard to the increased cost of shipping when a day or two is added to the job's cycle time. The employee's actions were to save time. In actuality, this behavior costs the company even more in freight charges.

The press is considered the drum, or pacing operation, within this firm. At times, it serves as the internal constraint. Press downtime is considered waste and undesirable. Specific to this firm's strategy, press downtime is one of the vital few performance goals to be measured. Therefore, it is a critical number and posted daily. Downtime is a focus of improvement activities in employee huddles. The third of the plant performance hypotheses is as follows:

H_{3c}: OBM will have a positive effect on press downtime.

Inventory Turns

Inventory turns is the last of the three critical elements in JIT systems (Crawford et al., 1988). It is also a cornerstone to world class manufacturing as it is one measure of inventory reduction (Haskell, 1991). It is an important measure of cash flow critical to many privately held firms.

Purchasing and accounting are the two departments that impact inventory turns directly. Inventory turns has been selected by this firm as a critical number due to the importance of cash flow to the company. The purchasing and accounting departments are among the first groups to be immersed in the OBM intervention. The key employees in these two departments will participate actively in the employee training and should be among the first to understand how their decisions and work behaviors directly affect the profitability of the firm. Inventory turns is one critical number tied directly to employee bonuses. Purchasing and accounting have a more direct impact on this critical number than any other group of employees. Therefore, the fourth hypothesis is as follows:

H_{3d}: OBM will have a positive effect on plant inventory turns.

Throughput Dollars

Providing the connection between firm performance measures and employees is the basis for the OBM intervention. Each element of the process serves as a mechanism for helping to establish such a link. Training classes provide employees with an opportunity to learn how different activities influence the bottom line. Information on the firm's progress towards its goals is provided on a frequent basis. Group huddles involve the discussion of these performance goals and how they can be reached. A measure involving the financial state of the business is typically included as one of the critical numbers.

Throughput dollars are defined as sales dollars less cost of materials. This is the profit measure consistent with the firm's adoption of Theory of Constraints operating policies. The firm has identified two critical values using throughput dollars to measure its financial well being. While throughput dollars is less direct to the critical employees than inventory turns, the financial training will serve as the vital element in creating the

connection between the employee and their impact on throughput dollars. The financial training is crucial to helping the employees understand how they make a difference on the bottom line. This training includes explanation of the different factors that affect throughput dollars and how different decisions and actions either increase or decrease these two ratios. Employee huddles and the budget review meeting use throughput dollars in their discussions. The final two hypotheses involve these measures:

> *H_{3e}: OBM will have a positive effect on plant throughput per dollar of operating expense; and*
>
> *H_{3f}: OBM will have a positive effect on plant throughput per employee.*

The research hypotheses are summarized in Table VII.

Experimental Method

The study took place over a fourteen-month period, beginning in the Fall of 1997. Open book management was implemented by using a variety of activities. First, small group training sessions were conducted by the accounting department at Plant A and completed over a fourteen-month period. The group met weekly for one to two hours over a six to eight week period. Plant B did not receive the training and served as a comparison group. Next, the company wide performance measures, discussed below, were enacted at both plants. These measures were posted at both plants weekly or monthly, depending on the data. For example, cost of credits, which are returned product, was an item that was measured and posted monthly. Throughput dollars, which is the dollar value of the product sold minus the raw material cost, was measured and posted daily as a part of two financial measures. The first was throughput per operating expense dollar, or for every dollar spent, what is the throughput. The second was throughput per employee, or the productivity of each employee.

Table VII. Study Hypotheses

H_1	*The implementation of OBM will have a positive effect on employee attitudes.*
H_{1a}	OBM will have a positive affect on organizational commitment.
H_{1b}	OBM will have a positive affect on perceived organizational support.
H_{1c}	OBM will have a positive affect on job involvement.
H_{1d}	OBM will have a positive affect on empowerment.
H_{1e}	OBM will have a negative affect on role ambiguity.
H_{1f}	OBM will have a negative affect on role conflict.
H_2	*The implementation of OBM will have a positive effect on employee outcomes.*
H_{2a}	OBM will have a positive effect on employee absenteeism.
H_{2b}	OBM will have a positive effect on employee tenure.
H_3	*The implementation of OBM will have a positive effect on plant performance.*
H_{3a}	OBM will have a positive effect on plant on-time delivery.
H_{3b}	OBM will have a positive effect on plant cost of credits.
H_{3c}	OBM will have a positive effect on plant press downtime.
H_{3d}	OBM will have a positive effect on plant inventory turns.
H_{3e}	OBM will have a positive effect on throughput per dollar of operating expense.
H_{3f}	OBM will have a positive effect on throughput per employee.

Subjects

The source of data for this study is a screen printing company in the Southeastern United States. On January 1, 1998, there were 225 employees company-wide and two production facilities. Forty-five employees were salaried and not considered for this research. Plant A, the plant receiving the treatment, had 98 hourly employees and plant B had 82. For descriptive purposes, the company mission and vision statements are included in the appendix.

Materials

There are three sets of dependent variables described in the following paragraphs: employee attitudes, employee outcomes, and plant performance. Trust is considered a potential moderating variable and will be measured using a scale modified for this study.

Employee Attitudinal Measures

A review of the literature has identified several attitudes expected to be impacted by OBM. Among those listed are organizational commitment, perceived organizational support, job involvement, and empowerment. Table VIII identifies the instruments used to measure change in employee attitudes. These instruments were completed both before and after the OBM implementation.

Table VIII. Instruments for Measuring Employee Attitudes

Measure*	**Source**
Organizational Commitment Questionnaire	Mowday, et al., 1979
Perceived Organizational Support	Eisenberger et al., 1986
Employee Empowerment Questionnaire	Hayes, 1994
Job Involvement	Kanungo, 1982
Role Conflict and Role Ambiguity	Rizzo et al., 1970

*Each instrument uses a 7 point Likert-type scale.

Employee Outcome Measures

Absenteeism

As a measure of performance, total hours absent monthly will be obtained for each person filling out the survey (Judge, Martochio, and Thoresen, 1997). Vacation-time is not included. This measure is authorized absence (AA). The employee has 24 hours of paid 'AA' time. Employees are encouraged to use vacation-time for scheduled time away from work, such as personal appointments, illness, etc. There is not an enforced policy for pre-notification regarding the use of vacation-time. For example, an employee can have an ill child and take a half-day vacation that day to go to the doctor. This is not included in authorized absence. Examples of AA include not showing up for work and not calling, being late (more than five minutes), and leaving work early without informing their manager.

Turnover

Given the longitudinal nature of the study, turnover will be measured. The hire date and termination date for all hourly employees at the firm during the study will be collected (Judge, Martochio, and Thoresen, 1997; Trevor, Gerhar, and Boudreau, 1997).

One concern with this measure involves rehired workers. Employees within this firm have left the firm and returned after a short time. The firm's policy is to not recognize the break in service, and the original hire date is used in calculating eligibility for employee benefits. For the purpose of this study, the rehire date will be used as the hire date of any affected employees.

Plant Performance Measures

The company measures each of its plant's performance based on the areas of improvement each has targeted. On-time delivery (the percent of jobs shipped by scheduled date) is calculated as the number of jobs scheduled to ship each day divided by the number that actually shipped. Cost of credits is measured as the dollar value of the credit on a monthly basis. Press downtime (waste) is the percentage of total press hours in which the press is not operating. Throughput per dollar of operating expense each month is measured, along with throughput per employee. Throughput dollars are defined as the selling price less raw material costs. Inventory turns are calculated monthly, using finished goods, work in process, and raw materials.

Moderator

Trust in the company and trust in the financial information will be measured using three items for both the company and the company's financial information. These items have been adapted from the trust in leader scale (Podsakoff, MacKenzie, Moorman, and Fetter, 1990) which is a six-item measure using a 7 point Likert-type scale.

Procedure

Both employee attitude and plant performance data were collected. The employee information was obtained using a two-page survey containing scales for each of the six hypothesized attitudes. Due to the length of the survey (82 items), attitudinal data was collected at intervals of approximately six months, occurring in August 1997, February 1998, and October 1998. Financial data (throughput dollars, operating expenses, throughput dollars per employee, cost of credits, inventory turns) were extracted from monthly financial reports. Plant performance measures (on time delivery, plant down-time) were collected at the monthly operations meeting. The human resources manager provided employee attendance and turnover data. In August 1997, both the president and the owner of the firm made simultaneous presentations to both plants announcing the implementation of OBM. They both discussed the training, measures, and potential rewards from this program. In February 1998, Plant A was approximately one third of the way through training the employees and the plant performance measures were being posted in the cafeteria. Plant B had the plant performance measures posted in the plant manager's office, but this plant's employees were not participating in any training activities.

For the employees in Plant A, the formal training consisted of a six-week course taught by the accounting department of the firm. Enrollment was limited to ten employees or less. Interactive learning techniques with hands on activities were used as one vehicle to help students learn. During the last three weeks of training, current company financial documents were the primary teaching tool. As a result of completing the class, employees were provided access to monthly financial statements from the company.

This is an unusual step for a privately held firm, where most financial information is available only to top management.

Feedback is made available to employees in Plant A on several levels. Critical numbers were posted daily or weekly, depending on the nature of the data. Daily information included items such as throughput measures, press downtime, and delivery performance. Items such as cost of credits were posted weekly since this was not a daily variable. Employee huddles occurred weekly in most departments, consisting of a review of the critical numbers and any pending manufacturing issues.

Plant-wide meetings took place on a monthly basis to highlight plant performance based on the critical numbers. Business games were used to encourage employees to read the scoreboards. Prizes were given away to employees that answered questions based on information provided on the scoreboard. These ranged from baseball hats and golf balls to $100 in cash. The more improvement made on plant performance measures, the greater the prize pool.

Budget meeting were scheduled for the 3rd and 4th quarter. These meetings included each department in Plant A and the controller. The controller reviewed the plant's financial budgets from the current year and worked with each department to set budgets for the upcoming year. Each employee had participated in the financial training before the budget meetings.

A bonus program frequently used in OBM interventions was developed in the 3rd quarter of the implementation year. Employees participated in the development of this program. It was designed to have a quarterly payout with the annual payout consisting of ten percent of the profits generated above the margin set by the corporate staff. If the

critical numbers were reached in that quarter, then one fourth of the bonus was paid. The system was set up so that if critical numbers were not met in one quarter, they would be rolled into the next one. Each quarter's improvement was one fourth of the annual goal. If the firm made half of the improvement for the year, all in the second quarter, then the employees would receive a bonus which included both first and second quarter's portion. Each employee would receive the portion of the bonus pool that was equal to the proportion of the their salary to the total compensation pool for the plant. After almost 12 months of implementation, the owner of the company (in October 1998) announced a reorganization of the company and that the OBM program would not be continued in 1999.

In addition to the organizational elements that have the propensity to confound the study, there are also procedural effects of concern. It is important to note that in the individual level model there is the potential for the confounding effect of common method variance. The trust measures (moderators) and employee attitude measures (endogenous variables) are all self-report measures with which data was collected with by a questionnaire. Method variance is the "variance produced by all other systematic influences on the measured variable" (Spector, 1984, p. 386). Spector (1984) notes that method variance can be minimized somewhat by two techniques: additional methods or sources of data and longitudinal studies. While additional sources for the data was not a viable alternative for the attitudinal measures, the longitudinal nature of the proposed model does diminish somewhat the potential effects of method variance.

CHAPTER IV

RESULTS

The results of the study were examined in two parts. First, each main hypothesis was tested. Reliability measures and power analyses were conducted where appropriate. Secondary analyses were then used to consider further any findings.

Employee Attitudes and OBM

Analysis of hypothesis one, OBM will have a positive impact on employee attitudes, was conducted first. Due to the stated relationship between these variables, Pearson's correlations were computed on all dependent variables and are presented in Table IX. The Pearson Correlations ranged from .24 to .8, with most being significant at the $p<0.0001$ level. The two potential moderators were included in the correlation matrix. Job involvement was not significantly correlated with role conflict or role ambiguity. Role conflict has an inverse relationship with the other attitude measures, as noted by the negative correlations. The stated relationship between the measures was supported, providing endorsement to a MANOVA being appropriate.

Cronbach's alphas were conducted for each scale for each time period and plant (Cronbach, 1951). This calculation of internal consistency is used to see to what extent the individual items correlate with one another and the test total. Table X includes the coefficient alpha reliability estimates for each of the scales used in the study. The reliability estimates for all of the variables except role conflict fall between .65 and .75. Role conflict is consistently above .80. Organizational commitment, job involvement, and perceived organizational support scales fall below Nunnally's recommended value of .70 for more than one time period for those surveys completed at Plant A (Nunnally, 1978).

Table IX. Pearson Correlations for Attitude Measures

	Org. Commit-ment	Job Involve-ment	Perceived Org. Support	Empowerment	Role Conflict	Role Ambiguity	Org. Trust	Financial Trust
Organizational Commitment	1.0000 0.0	0.5048 0.0001	0.8052 0.0001	0.4820 0.0001	-0.4776 0.0001	0.3801 0.0001	0.8064 0.0001	0.7170 0.0001
Job Involvement		1.0000 0.0	0.4990 0.0001	0.2423 0.0014	-0.1116 0.1511	0.0988 0.2052	0.4410 0.0001	0.4124 0.0001
Perceived Organizational Support			1.0000 0.0	0.5720 0.0001	-0.4838 0.0001	0.3211 0.0001	0.7868 0.0001	0.6940 0.0001
Empowerment				1.0000 0.0	-0.4224 0.0001	0.4492 0.0001	0.4607 0.0001	0.4098 0.0001
Role Conflict					1.0000 0.0	-0.47217 0.0001	-0.3984 0.0001	-0.3515 0.0001
Role Ambiguity						1.0000 0.0	0.3225 0.0001	0.2320 0.0026
Organizational Trust							1.0000 0.0	0.7741 0.0001
Financial Trust								1.0000 0.0

Table X. Coefficient Alpha Reliability Estimates for Attitudinal Measures

Variable	Plant A, Time 1	Plant A, Time 2	Plant A, Time 3	Plant B, Time 1	Plant B, Time 2	Plant B, Time 3
Organizational Commitment	0.6696	0.6353	0.7116	0.7216	0.7064	0.7112
Job Involvement	0.6876	0.6671	0.7115	0.7456	0.7322	0.7180
Perceived Organizational Support	0.6643	0.6089	0.6926	0.7204	0.6959	0.7055
Empowerment	0.7184	0.6986	0.7523	0.7677	0.7552	0.7683
Role Conflict	0.8482	0.8269	0.8627	0.8803	0.8843	0.8735
Role Ambiguity	0.7275	0.6853	0.7282	0.7897	0.7773	0.7736

Out of 237 survey sets, only 53 individuals total completed both the before and after administration of the survey. The second administration of the survey was not used in the analysis. Originally, Plant A was to have completed the intervention by the time of the second survey. The intervention was not completed until the Fall of 1988, at the time of the third administration of the survey. The General Linear Models Procedure for Repeated Measures Multivariate Analysis of Covariance (MANCOVA) for the model was conducted. The two predicted moderating variables, organizational and financial trust, were the covariates.

First, the main effect of the treatment and covariates was examined. The overall main effect (OBM) was not significant (Λ=0.9011, F=0.8045, df=6,44, p>.05). The effect of the covariate organizational trust was significant (Λ=0.6072, F=4.7434, df=6,44 , p<.05). The effect of the covariate financial trust was not significant (Λ=0.9514, F=0.3750, df=6,44 , p<.05). The two trust measures were highly correlated and the first trust measure appears to have included their common effect, leaving nothing unique for the second trust measure. Next, the effect of time (or repeated measure) was investigated. This effect was significant (Λ=0.6139, F=4.6113, df=6,44 , p<.05). The final test was conducted on the interaction effect between the treatment and time, which was not significant (Λ=0.8380, F=1.4173, df=6,44 , p<.05).

The power of the above statistical tests was examined. The power of a statistical test is the probability of rejecting the null hypothesis when it is false, or failing to find an effect that is present. Stevens (1980, 1986) presents a lengthy discussion of the estimation of power in MANOVA. The measure of effect size is the multivariate D^2, Mahalanobis distance. According to Stevens, (1986) the multivariate measure $Dhat^2$ is a

"natural squared generalization of the univariate measured, where the means have been replaced by mean vectors and s (standard deviation) has been replaced by its squared multivariate generalization of within variability, the sample covariance matrix, S." Mahalanobis D^2 is estimated using discriminant analysis for the pairwise squared distances between groups. With N=53, six variables, and $Dhat^2$ =0.7569, the power of the test is 0.8518—a moderate level. This power estimate calculated by PROC DISCRIM is consistent with the approximation provided by Stevens (1986) equal to 0.86.

Employee Outcomes and OBM

The next procedure tested H_2, OBM will have a positive impact on employee outcomes. Employee absenteeism and turnover with the company were examined. The effect of the intervention on employee absenteeism was initially tested using repeated measures ANCOVA. Out of the 194 employees that were employed with the firm over the course of the study and participated in the activities, only 83 stayed for the duration. There was no significant effect on absenteeism due the treatment, or the covariates ($p>.05$) (see Tables XI and XII).

Table XI. Repeated Measures ANCOVA Results for Absenteeism

MANOVA Test	Results:
Effect of Time	Λ=0.6086, F=1.6955, df=22 58, p>.05
Effect of Time*Treatment	Λ=0.7039, F=1.1088, df=22 58, p>.05
Effect of Time*Organizational Trust	Λ=0.7214, F=1.0783, df=22 58, p>.05
Effect of Time*Financial Trust	Λ=0.6924, F=1.1714, df=22 58, p>.05

Table XII. Between Subjects Effects (Absenteeism)

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Treatment	1	6.2366	6.2366	0.58	.4473
Organizational Trust	1	14.0163	14.0163	1.31	0.2557
Financial Trust	1	5.3566	5.3566	0.50	0.4812
Error	79	844.7586	10.6931		

Categorical modeling was utilized for the turnover measure. The data was in the form of a zero/one variable for employee turnover. The treatment effect was also a zero/one variable for receiving the treatment. The logit analysis was conducted using CATMOD on the effect the treatment had on the probability that the employee would leave. A maximum likelihood analysis of variance revealed that neither the treatment nor the covariates were significant ($p>.05$) (see Table XIII).

Table XIII. Results of Logit Analysis for Turnover

Source	DF	Chi-Square	Probability
Intercept	1	14.27	0.0002
Treatment	1	1.93	0.1650
Organizational Trust	6	1.49	0.9599
Financial Trust	6	3.95	0.6831
Likelihood Ratio	31	37.51	0.1954

Plant Performance Measures and OBM

Analysis for the final set hypotheses, OBM will have a positive impact on plant performance, was conducted. When treated as a repeated measures MANCOVA, accounting for the 24 months of observations for each variable and the two covariates (organizational and financial trust), the model contains only two observations--Plant A and Plant B. There are no degrees of freedom to associate with either covariate. Stevens (1986) suggests using univariate analysis even in multivariate situations, as long it is modified to control for family wise Type I error. Family wise Type I error is the error rate for the entire set of comparisons. For example, if c equals the number of comparisons and α=.05, then the family wise error rate for this test is equal to .265, not .05. By changing α to the .01 level, this reduces the family wise error rate to .058. This alpha (α = .01) is used for each test in the analysis and the sum of alpha used in all of the comparison is the true alpha value for Type I error. The dependent nature of the dependent variables also tends to increase the probability of a Type I error, which is why unplanned comparisons should be avoided.

Pearson's correlations were computed on all dependent variables and are presented in Table XIV. The anticipated relationship between dependent variables did not emerge. The only two variables that were significantly correlated were the two throughput measures, as they each use Throughput Dollars in their ratio. Individual ANCOVAs were then conducted to test these hypotheses and are presented the following tables. The model included the main effect of treatment along with the covariate effects, with α=.01. On-time delivery, press downtime, and inventory turns were the three performance measures that had significant models ($p<.05$).

Table XIV. Pearson Correlations and P Value for Plant Performance Measures

(correlation/ p value)	On-time Delivery	Cost of Credits	Press Downtime	Inventory Turns	Through-put per $ of Operating. Expense	Through-put per Employee	Org. Trust	Financial Trust
On-time Delivery	1.0000 0.0	0.2637 0.0875	0.0740 0.6728	0.01636 0.9171	0.1620 0.2994	0.0614 0.6957	0.2974 0.0528	0.3246 0.0337
Cost of Credits		1.0000 0.0	0.1409 0.4125	-0.1229 0.4051	-0.1223 0.4075	0.0427 0.7731	-0.3822 0.7965	-0.01392 0.9252
Press Downtime			1.0000 0.0	-0.4135 0.0122	0.2823 0.0953	0.4273 0.7731	-0.3000 0.0755	-0.2959 0.1171
Inventory Turns				1.0000 0.0	0.0729 0.6225	0.0618 0.6767	-0.1201 0.4162	-0.2330 0.1110
Throughput per dollar of Operating Expenses					1.0000 0.0	0.8232 0.0001	-0.1529 0.2996	-0.1345 0.3622
Throughput : per Employee						1.0000 0.0	-0.1822 0.2152	-0.1836 0.2114
Organizational Trust							1.0000 0.0	0.7741 0.0001
Financial Trust								1.0000 0.0

On-Time Delivery

The model found in Table XV is significant with $p<0.003$ and $R^2=0.4312$. Both the treatment (three measures) and covariates (two measures) effects were significant for on-time delivery. The adjusted least square means are provided in Table XVI. The difference between means was significant for each time, indicating a change before, during, and after the treatment.

Table XV. ANCOVA Results for Dependent Variable: On-time Delivery

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	4	0.4312	0.1078	6.80	0.0003
Error	38	0.6026	0.0159		
Corrected Total	42	1.0337			
Source	DF	Type III SS	Mean Square	F Value	Pr>F
Treatment	2	0.3001	0.1501	9.46	0.0005
Org. Trust	1	0.1282	0.1282	8.08	0.0071
Fin. Trust	1	0.1238	0.1238	7.80	0.0081

Table XVI. On-time Delivery Adjusted Least Squared Means

Time	LS Mean	Std Err	Difference at .05 level
1	0.8684	0.1117	A
2	1.0935	0.1325	B
3	-1.5075	0.7368	C

Cost of Credits

The model was not significant for cost of credits (see Table XVII), $p>.05$. The F value (0.37) was extremely low, indicating little, if any effect. Cost of credits is the dollar value of returned product that month. It is important to note that there is a significant lag (up to six months) between when the customer receives the defective product and when the company received the product as a return and notes it as a cost of credit.

Table XVII. ANCOVA Results for Dependent Variable: Cost of Credits

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	4	19913167.4	4978291.8	0.37	0.8276
Error	43	576174306.3	13399402.5		
Corrected Total	47	596087473.7			
Source	DF	Type III SS	Mean Square	F Value	Pr>F
Treatment	2	9554682.4	4777341.2	0.36	0.7021
Org. Trust	1	3766654.3	3766654.3	0.28	0.5987
Fin. Trust	1	3704745.0	3704745.0	0.28	0.6017

Press Downtime

The model for press downtime (Table XVIII) is found significant with $p<0.0003$ and $R^2=0.4784$. Both the treatment effect and the covariates are significant, the adjusted least squared means (Table XIX) provide additional illustration of the main effects. The treatment was significant with the moderating effects of trust filtered out. In time 3, after the treatment was completed, there was a significant reduction in the mean downtime from the previous two time periods.

Table XVIII. ANCOVA Results for Dependent Variable: Press Downtime

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	4	283688.405	70922.101	7.11	0.0003
Error	31	309289.234	9977.072		
Corrected Total	35	592977.639			
Source	DF	Type III SS	Mean Square	F Value	Pr>F
Treatment	2	221628.35	110814.17	11.11	0.0002
Org. Trust	1	140614.11	140614.11	14.09	0.0007
Fin. Trust	1	143059.13	143059.13	14.34	0.0007

Table XIX. Press Downtime Adjusted Least Squared Means

Time	LS Mean	Std Err	Difference at .05 level
1	950.73	133.29	A
2	951.63	160.46	A
3	-3030.22	894.36	B

Inventory Turns

The model for inventory turns is found significant with $p<0.0001$ and $R^2=0.6310$. The treatment effect was the only significant effect in the analysis (Tables XX and XXI). The adjusted mean for inventory turns was significantly higher in time two, during the treatment from time one (pre-treatment). However, time period 3 was not different from either of the previous two time periods. Reviewing the data suggests that there may be some contamination of the inventory turns measure during the last six months of data collection and differences in time three may be compromised.

Table XX. ANCOVA results for Dependent Variable: Inventory Turns

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	4	7072.6298	1768.1574	18.38	0.0001
Error	43	4135.5703	96.1761		
Corrected Total	47	11208.2001			
Source	DF	Type III SS	Mean Square	F Value	Pr>F
Treatment	2	2680.9395	1340.4697	13.94	0.0001
Org. Trust	1	7.8918	7.8918	0.08	0.7759
Fin. Trust	1	8.1006	8.1006	0.08	0.7730

Table XXI. Inventory Turns Adjusted Least Squared Means

Time	LS Mean	Std Err	Difference at .05 level
1	21.12	8.8877	A
2	39.60	9.9143	B
3	66.65	34.9498	A B

Throughput

Neither model involving throughput was significant at the $p<.05$ level. The model including throughput per dollar of operating expense was not significant at the $p<05$ level (Table XXII). The model was not significant for throughput per number of employees (see Table XXIII). This ratio is considered to be a measure of individual productivity by the firm.

Table XXII. ANCOVA results for Dependent Variable: Throughput per Dollar of Operating Expense

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	4	0.3427	0.0857	2.06	0.1023
Error	43	1.7853	0.0415		
Corrected Total	47	2.1280			
Source	DF	Type III SS	Mean Square	F Value	Pr>F
Treatment	2	0.2780	0.1390	3.35	0.0445
Org. Trust	1	0.2622	0.2622	6.31	0.0158
Fin. Trust	1	0.2648	0.2648	6.38	0.0153

Table XXIII. ANCOVA results for Dependent Variable: Throughput per Employee

Source	DF	Sum of Squares	Mean Square	F Value	Pr>F
Model	4	6307876.83	1576969.21	1.46	0.2324
Error	43	46591474.54	1083522.66		
Corrected Total	47	52899351.37			
Source	DF	Type III SS	Mean Square	F Value	Pr>F
Treatment	2	4518715.66	2259357.83	2.09	0.1367
Org. Trust	1	4289365.87	4289365.87	3.96	0.0530
Fin. Trust	1	4356362.63	4356362.63	4.02	0.0513

Employee Attitudes and Organizational Trust

In the model, organizational trust was one of two potential moderators. Given its overall significant result as a covariate with the attitude measures, organizational trust was isolated and put into the model as the main effect. The overall main effect was significant (Λ=0.3602, F=13.62, df=6,46, $p<.05$). Next, the effect of time (or repeated measure) was investigated. This effect was significant (Λ=0.6481, F=4.16, df=6,46 , $p<.05$). The final test was conducted on the interaction effect between the treatment and time, which was also significant (Λ=0.6508, F=4.11, df=6,46, $p<.05$). The confounding implications of the interaction makes it difficult to isolate the differences due to organizational trust and those due to time alone.

Plant Performance and Moderators

Both financial trust and organizational trust were significant covariates for on-time delivery and press downtime. Due to missing data, press downtime was dropped from the secondary analysis of the covariates. Separate analyses were done with organizational trust and financial trust as the treatment effect. The high level of correlation between these two variables is reflected in their identical results.

The overall main effect of organizational trust on on-time delivery was significant (Λ=0.4727, F=11.15, df=1,10, $p<.05$). Next, the effect of time (or repeated measure) was investigated. This effect was significant (Λ=0.5159, F=9.39, df=1,10 , $p<.05$). The final test was conducted on the interaction effect between the treatment and time, which was also significant (Λ=0.5147, F=9.43, df=1,10, $p<.05$). With the interaction term significant, it is difficult to find what part of the effect of organizational trust was independent of time.

The overall main effect of financial trust on on-time delivery was significant (Λ=0.4727, F=11.15, df=1,10, $p<.05$). Next, the effect of time (or repeated measure) was investigated. This effect was significant (Λ=0.5159, F=9.39, df=1,10 , $p<.05$). The final test was conducted on the interaction effect between the treatment and time, which was also significant (Λ=0.5147, F=9.43, df=1,10, $p<.05$). With the interaction term significant, it is difficult to find what part of the effect of financial trust was independent of time.

CHAPTER V

DISCUSSION

The discussion section has two parts. First, the summary of the results and possible limitations of the study are presented. Then implications for future research are provided.

Summary of Results and Limitations

Employee Attitudes

The proposed effect of the treatment on employee attitudes did not emerge. Difficulties in the implementation of the study may have kept employees from buying into the project. The abrupt announcement at the end of the intervention regarding its cancellation may have confounded any change that had occurred.

The power of the test was moderate ($Dhat^2 = 0.8518$) but not strong. Organizational trust, the moderator, did have a significant effect. Unfortunately, the interaction between organizational trust and time is significant, making it difficult to isolate the individual effect. Sample size was lower than anticipated (n=53) and the treatment group was extremely small (n=17). In addition, many of the employee attitudes were highly related, reducing the amount of unique construct available to measure for change.

Another part of the problem contributing to the seemingly contradictory evidence is the imperfection of the instruments used to capture attitudes and perceptions of employees. The reliability coefficients of the scales serve as one indication of that problem. There are a variety of measures for employee attitudes. Job satisfaction,

organizational commitment, job involvement, even turnover intentions, have multiple measures that each specify the construct in subtly different ways. This issue was highlighted in Cohen's (1993) meta-analysis on the relationship between organizational commitment and turnover. The measure of commitment used strongly influenced the strength of the relationship between the attitude and the outcome.

Employee Outcomes

The intervention was not a significant factor for employee outcomes. Sample size is once again an issue. While 83 individuals had complete data, only 29 participated in the treatment. Historically, absenteeism has been difficult to assess and the tracking of tardiness was not possible. Only reported AA (authorized absence) time was captured, leaving much of the time away from work reported only to the supervisor and not to human resources.

It is important to note that influential moderators of turnover do exist and include factors such as unemployment level, availability of attractive alternatives, and occupation (Hom, Caranikas-Walker, Prussia, and Griffeth, 1992; McEvoy and Cascio, 1987). The unemployment rate in the firm's geographical region was at an all time low (<3%). The move of a competing industry into the area during the time of the study has the potential effect of creating attractive alternatives within a short driving distance. Both of these factors influence turnover independent of the treatment.

Turnover was more strongly influenced by the full version of the Organizational Commitment Questionnaire (OCQ) than by the shorter version. It was noted that the full version actually contains items that mention turnover specifically. Details regarding the development of the OCQ can be found in Porter, Steers, Mowday, and Boulian (1971).

Plant Performance

The predicted effect of the treatment on on-time delivery was present, along with both covariate measures. The level of trust in the organization and in the financial information should be considered when implementing OBM into an organization. The two covariates may also be affected by the treatment. From the adjusted least squared means, there is an improvement from the pre-treatment time to the treatment time period, but there was a decline in on-time delivery in the post treatment time period. This post treatment time period may have been contaminated by the owner's announcement of the elimination of the program and also the bonus that was to be implemented in the next quarter. The bonus was tied directly to the plant performance measures.

The effects on plant downtime are consistent with the findings regarding on-time delivery. The treatment and the covariates were all significant in the model. The adjusted least squared means indicate that there was a significant reduction in press downtime after the treatment. One concern about this reduction is its dependence on capacity. If there are fewer jobs booked on the presses, there is more time for preventive maintenance. The post treatment time includes November and December holidays when business is traditionally down. This may have artificially inflated the reduction.

The model for inventory turns was significant for main effects of the treatment but not for the covariates. The improvement for the treatment period was significantly different than the pre-treatment periods. Inventory turns are influenced by a relatively small group of people at the facility. It may be that inventory turns are effected by a small group of managers more so than the employees as a whole. Organizational and financial trust for the key individuals may be a moderator.

The other three plant performance variables, cost of credits, throughput per dollar of operating expense, and throughput per employee, were not significantly affected by the treatment. Interestingly, these three are all financial measures that may have more potential confounding factors than inventory turns, including the labor market, overtime, and material costs.

The firm took a gradual approach to implementing OBM. It chose not to use an "implementation" plan, but rather "learn as you go." The implementation did not carry with it a sense of urgency—there was no obvious crisis to latch on to. At a crucial juncture, the implementation of the bonus program, the firm announced the end of the program.

A new framework was established merging the performance management and hoshin planning perspectives that proposes a method for connecting organizational goals and employees through employee management systems. Open book was introduced as an example of an intervention utilizing both fields of study. The impact of the intervention was mixed. No effect was found for employee attitudes or outcomes. There was a limited impact on plant performance indicators.

New Model

In reviewing the findings and issues with the implementation, the model in Figure 2 emerges. Given a more complete and thorough implementation, employee attitudes should shift over time. The trust in financial information construct would be influenced by the model and both role ambiguity and role conflict would not be included. Cost of credits, due to the rather lengthy time lag between the action and result, would be dropped from the model.

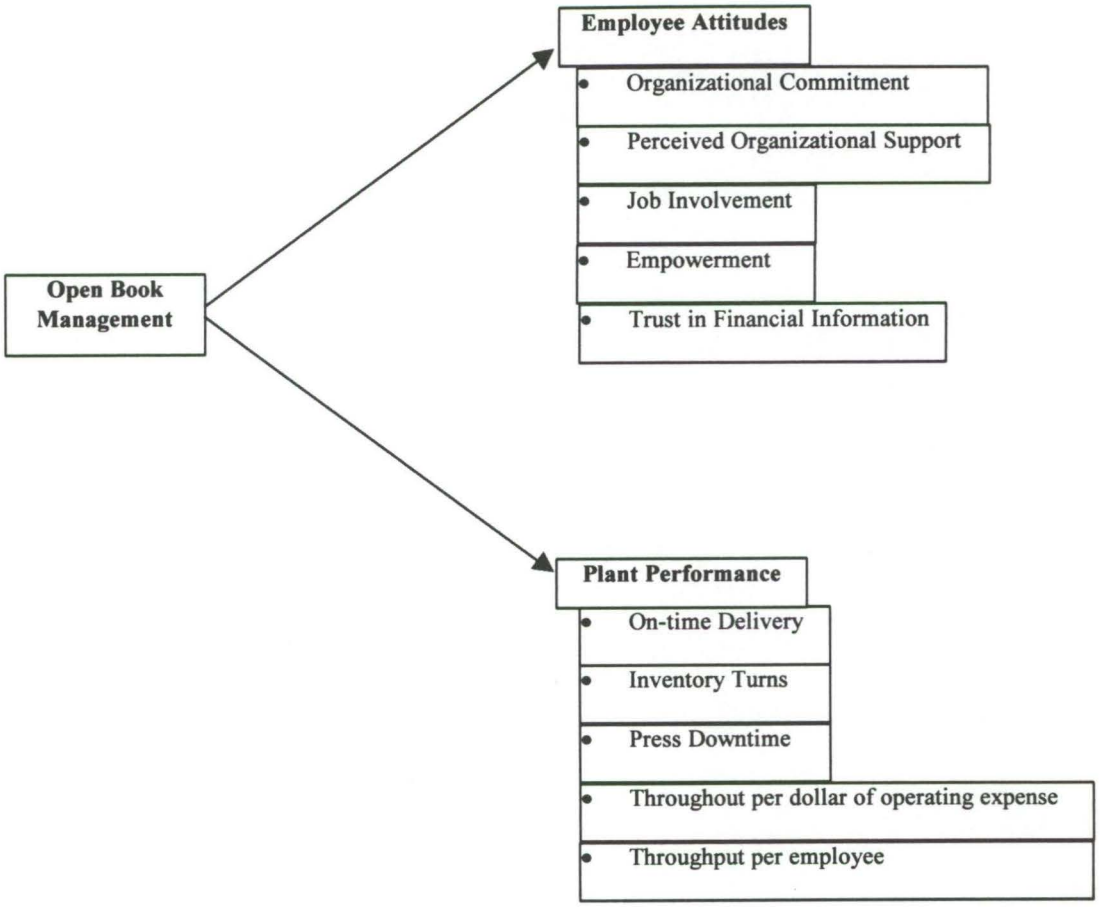

Figure 2. Revised Model of the Effects of Open Book Management

Future Research

The need for more field-based research in open book management is evident. This study served as a beginning and revealed some of the impact that employee management systems may have on performance goals. It is descriptive in nature in its explanation of the elements and origins of open book management. Difficulties in field research (i.e., small sample size, lack of generalizability, confounding effect) appear to have contributed to the inconclusive nature of some of the findings.

The treatment appears to have focused employees towards the vital few company goals—on-time delivery, press downtime, and inventory turns. Plant performance improvements indicate that the combined effects of training, goal setting, and feedback can influence employee behavior on the shop floor. Further study is needed to examine which elements have the greater influence and through what mechanisms.

Further research is needed to address the shortcomings of this study. Multiple firms in both similar and different industries should be examined. A multi-site study with a pre and post intervention measure for attitudes could better find any change in attitudes due to the intervention. A longer study with the inclusion of a bonus program might provide a useful contribution. The firm studied failed to implement this part of the OBM program, which may provide some explanation for the lack of effect on employee attitudes and outcomes and also plant performance. Even though not every firm uses a bonus program in the implementation of OBM, it may provide a sense of motivation that was lacking in this implementation.

APPENDICES

Appendix A

Survey Instrument

Listed below is a series of statements that represent possible feelings that employees might have about the company or organization for which they work. With respect to your own feelings about the FB Johnston Group, please circle the level of your agreement or disagreement for each sentence.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
1. I am willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful.	1	2	3	4	5	6	7
2. I talk up this organization to my friends as a great organization to work for.	1	2	3	4	5	6	7
3. I feel very little loyalty to this organization.	1	2	3	4	5	6	7
4. I would accept almost any type of job assignment in order to keep working for this organization.	1	2	3	4	5	6	7
5. I find that my values and the organization's values are very similar.	1	2	3	4	5	6	7
6. I am proud to tell others that I am part of this organization.	1	2	3	4	5	6	7
7. I could just as well be working for a different organization as long as the type of work was similar.	1	2	3	4	5	6	7
8. This organization really inspires the very best in me in the way of job performance.	1	2	3	4	5	6	7
9. It would take very little change in my present circumstances to cause me to leave this organization.	1	2	3	4	5	6	7
10. I am extremely glad that I chose this organization to work for over others I was considering at the time I joined.	1	2	3	4	5	6	7
11. There's not too much to be gained by sticking with this organization indefinitely.	1	2	3	4	5	6	7
12. Often, I find it difficult to agree with this organization's policies on important matters relating to its employees.	1	2	3	4	5	6	7
13. I really care about the fate of this organization.	1	2	3	4	5	6	7
14. For me this is the best of all possible organizations for which to work.	1	2	3	4	5	6	7
15. Deciding to work for this organization was a definite mistake on my part.	1	2	3	4	5	6	7
16. The most important things that happen to me involve my present job.	1	2	3	4	5	6	7
17. To me, my job is only a small part of who I am.	1	2	3	4	5	6	7
18. I am very much involved personally in my job.	1	2	3	4	5	6	7
19. I live, eat, and breathe my job.	1	2	3	4	5	6	7
20. Most of my interests are centered around my job.	1	2	3	4	5	6	7
21. Usually I feel detached from my job.	1	2	3	4	5	6	7
22. Most of my personal life goals are job oriented.	1	2	3	4	5	6	7
23. I feel depressed when I fail at something connected with my job.	1	2	3	4	5	6	7
24. I consider my job to be very central to my existence.	1	2	3	4	5	6	7
25. I like to be absorbed in my job most of the time.	1	2	3	4	5	6	7
26. The most important things that happen in life involve work.	1	2	3	4	5	6	7
27. Work is something people should get involved in most of the time.	1	2	3	4	5	6	7
28. Work should be only a small part of one's life.	1	2	3	4	5	6	7
29. Work should be considered central to life.	1	2	3	4	5	6	7
30. In my view, an individual's personal life goals should be work oriented.	1	2	3	4	5	6	7
31. Life is worth living only when people get absorbed in work.	1	2	3	4	5	6	7
32. I feel quite confident that the FB Johnston Group will always try to treat me fairly.	1	2	3	4	5	6	7
33. The FB Johnston Group would never try to gain an advantage by deceiving workers.	1	2	3	4	5	6	7
34. I have complete faith in the integrity of the FB Johnston Group.	1	2	3	4	5	6	7
35. I feel quite confident that the company's financial and performance information is used fairly.	1	2	3	4	5	6	7
36. Company financial and performance information would never be used to gain an advantage by deceiving workers.	1	2	3	4	5	6	7
37. I have complete faith in the integrity of the company's financial and performance information.	1	2	3	4	5	6	7

Listed below is another series of statements that represent possible feelings that employees might have about the company or organization for which they work. With respect to your own feelings about the company, please circle the level of your agreement or disagreement for each sentence.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
38. The organization values my contribution to its well-being.	1	2	3	4	5	6	7
39. If the organization could hire someone to replace me at a lower salary it would do so.	1	2	3	4	5	6	7
40. The organization fails to appreciate any extra effort from me.	1	2	3	4	5	6	7
41. The organization strongly considers my goals and values.	1	2	3	4	5	6	7
42. The organization would ignore any complaint from me.	1	2	3	4	5	6	7
43. The organization disregards my best interests when it makes decisions that affect me.	1	2	3	4	5	6	7
44. Help is available from the organization when I have a problem.	1	2	3	4	5	6	7
45. The organization really cares about my well-being.	1	2	3	4	5	6	7
46. The organization is willing to extend itself in order to help me perform my job to the best of my ability.	1	2	3	4	5	6	7
47. Even if I did the best job possible, the organization would fail to notice.	1	2	3	4	5	6	7
48. The organization is willing to help me when I need a special favor.	1	2	3	4	5	6	7
49. The organization cares about my general satisfaction at work.	1	2	3	4	5	6	7
50. If given the opportunity, the organization would take advantage of me.	1	2	3	4	5	6	7
51. The organization shows very little concern for me.	1	2	3	4	5	6	7
52. The organization cares about my opinions.	1	2	3	4	5	6	7
53. The organization takes pride in my accomplishments at work.	1	2	3	4	5	6	7
54. The organization tries to make my job as interesting as possible.	1	2	3	4	5	6	7
55. I am allowed to do almost anything to do a high-quality job.	1	2	3	4	5	6	7
56. I would like a job that would allow me more authority.	1	2	3	4	5	6	7
57. I have the authority to correct problems when they occur.	1	2	3	4	5	6	7
58. I am allowed to be creative when I deal with problems at work.	1	2	3	4	5	6	7
59. I do not have to go through a lot of red tape to change things.	1	2	3	4	5	6	7
60. I have a lot of control over how I do my job.	1	2	3	4	5	6	7
61. I do not need to get management's approval before I handle problems.	1	2	3	4	5	6	7
62. I have a lot of responsibility in my job.	1	2	3	4	5	6	7
63. I am encouraged to handle job-related problems by myself.	1	2	3	4	5	6	7
64. I can make changes on my job whenever I want.	1	2	3	4	5	6	7
65. I have to follow procedures closely in my job.	1	2	3	4	5	6	7
66. I have to go through a lot of red tape to get things done around here.	1	2	3	4	5	6	7
67. I wish management would give me more authority.	1	2	3	4	5	6	7
68. I can take charge of problems that require immediate attention.	1	2	3	4	5	6	7

Please indicate the degree to which the following conditions exist for you at the company:	Very False	False	Somewhat False	Neutral	Somewhat True	True	Very True
69. I have to do things that should be done differently.	1	2	3	4	5	6	7
70. I receive an assignment without the manpower to complete it.	1	2	3	4	5	6	7
71. I have to buck a rule or policy in order to carry out an assignment.	1	2	3	4	5	6	7
72. I work with two or more groups who operate quite differently.	1	2	3	4	5	6	7
73. I receive incompatible requests from two or more people.	1	2	3	4	5	6	7
74. I do things that are apt to be accepted by one person and not accepted by others.	1	2	3	4	5	6	7
75. I receive an assignment without adequate resources and materials to execute it.	1	2	3	4	5	6	7
76. I work on unnecessary things.	1	2	3	4	5	6	7
77. I feel certain about how much authority I have.	1	2	3	4	5	6	7
78. Clear, planned goals and objectives for my job.	1	2	3	4	5	6	7
79. I know that I have divided my time properly.	1	2	3	4	5	6	7
80. I know what my responsibilities are.	1	2	3	4	5	6	7
81. I know exactly what is expected of me.	1	2	3	4	5	6	7
82. Explanation is clear of what is to be done.	1	2	3	4	5	6	7

Appendix B

Company Mission and Vision Statements

Company Mission Statement:

Our mission is to be our industry's highest return on assets employed company and to grow at an average annual rate of 15%. To achieve these financial objectives, we will provide our team members with continuing opportunities for personal and professional growth, invest in the technologies that will meet the current and future needs of our customers, and invest the time and resources in our community and industry required to be a positive influence. Finally, to achieve our mission, we will seek markets with fast growth potential that require custom visual solutions, with customers having the following attributes:

- High potential value-added needs.
- Repeating needs.
- Potential to buy from both divisions.
- Market leaders.
- Value high quality standards.
- Value quick response.
- Logistically compatible with TOC.

Vision Statement:

To be held by those to whom we supply products and services as the standard of excellence for innovation, responsiveness, and dependability.

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